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Cavan
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Cavan County Council

N3 Virginia Bypass

Option Selection Report
Volume 1 Main Report

May 2023

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Overarching Structure of Option Selection Report

Volume Ref. No. & Title	Contents
Volume 0 – Executive Summary	
Volume 1 – Main Report	
Volume 2 – Drawings	Part A – Corridor Drawings Part B – Constraints and Environmental Drawings
Volume 3 – Constraints Study Report	Main Report
Volume 4 – Phase 2 Stage 1 Assessment Appendices	Part A – Not Used Part B – Assessment Scoring Matrix
Volume 5 – Stage 2 Environmental Appraisal Report	Main Report & Associated Appendices
Volume 6 – Engineering Appendices	Part A – Assessment of Alternatives Part B – Traffic Modelling Report Part C – Not Used Part D – Not Used Part E – RSA Stage F Part 1 Report Part F – RSA Stage F Part 2 Report Part G – Road Safety Impact Assessment Part H – Geotechnical SOI & PSSR
Volume 7 – Project Appraisal Balance Sheet (PABS)	PABS

Table of Contents

SECTION 1: INTRODUCTION AND DESCRIPTION 1
1.1 General 1
1.2 Description of the Existing Network 2
1.3 History of the Project and Previous Scheme Development 4
1.4 Purpose of the Option Selection Report 7
1.5 Scheme Objectives 8
1.6 Design Strategies 13
SECTION 2: IDENTIFICATION OF NEED 14
2.1 Strategic Fit and Priority of the Project 14
2.2 Development Policy 14
2.3 Project Specific Need 29
2.4 Need for Scheme - Summary 42
SECTION 3: TRAFFIC ASSESSMENT AND OPTION CROSS SECTION 43
3.1 Introduction 43
3.2 Modelling Overview 43
3.3 Data Collection 44
3.4 Traffic Modelling 45
3.5 Future Year Model Development 49
3.6 Traffic Assessment of Corridor Options 54
3.7 Initial Selection of Road Type 56
3.8 Consideration of Indicative Junction Design Approach 57
SECTION 4: CONSTRAINTS STUDY 59
4.1 Introduction 59
4.2 Natural and Physical Constraints & External Parameters 60
4.3 Recent Constraints 65
SECTION 5: CONSIDERATION OF ALTERNATIVES AND OPTIONS 67
5.1 Introduction 67
5.2 Do-Nothing Option 67
5.3 Do-Minimum Option 68
5.4 Assessment of Alternatives and Alignment with NIFTI 68
5.5 Do-Something Option – Feasible Corridor 73
SECTION 6: METHODOLOGY FOR PHASE 2 OPTION SELECTION PROCESS 74
6.1 Introduction 74
6.2 Stage 1 Preliminary Options Assessment 74
6.3 Stage 2 Project Appraisal Matrix 75
6.4 Stage 3 Preferred Option 78
SECTION 7: NON-STATUTORY PUBLIC CONSULTATIONS 79
7.1 Introduction 79
7.2 Public Consultation No. 1 – Constraints & Initial Preliminary Options 79
7.3 Public Consultation No. 2 – Shortlisted Options 80
7.4 Public Consultation No. 3 – Emerging Preferred Option Corridor 83
7.5 Consultation with Statutory Bodies 85
SECTION 8: STAGE 1 – PRELIMINARY OPTIONS ASSESSMENT 87
8.1 Preliminary Options 87
8.2 Engineering Assessment 90
8.3 Environment Assessment 94
8.4 Economy Assessment 111

8.5 Overall Stage 1 Assessment Summary 112
8.6 Recommendation of Options to be taken forward to Stage 2 (Project Appraisal Matrix) 119

SECTION 9: STAGE 2 – PROJECT APPRAISAL MATRIX 122

9.1 Shortlisted Options 122
9.2 Economy Appraisal 126
9.3 Safety Appraisal 131
9.4 Environment Appraisal 135
9.5 Accessibility and Social Inclusion Appraisal 178
9.6 Integration Appraisal 181
9.7 Physical Activity Appraisal 193
9.8 Stage 2 Project Appraisal Matrix 196
9.9 Recommendation 201

SECTION 10: STAGE 3 – PREFERRED OPTION AND PREPARATION OF PABS 203

10.1 Introduction 203
10.2 Project Appraisal Balance Sheet 203
10.3 Alignment of Preferred Option with Policy Objectives 215
10.4 Alignment of Preferred Option with Project Objectives 219
10.5 Road Safety Audit (Stage F Part 2) 222
10.6 Preferred Option with Alternative Demand Sensitivity Test 223
10.7 Recommendation 223

List of Figures

Figure 1-1: TII's Project Management Guidelines Project Phases (Excerpt from TII's PMGs) 2
Figure 1-2 Location of Virginia along the M3/N3 Dublin to Cavan Route 3
Figure 1-3 Scheme Study Area (at Phase 2) 4
Figure 1-4: N3 Virginia Bypass (2003) 5
Figure 1-5 Route Options Considered for N3 North of Kells to Cavan scheme 7
Figure 1-6 TII's Phase 2 Three Stage Option Selection Process as outlined in TII Publications 8
Figure 2-1 TEN-T Core and Comprehensive Transport Network in the North and Border Region 15
Figure 2-2 NPF Configuration of the Regional Assemblies in Ireland 16
Figure 2-3 NIFTI Investment Priorities 19
Figure 2-4 NIFTI Modal Hierarchy 19
Figure 2-5 NIFTI Intervention Hierarchy 20
Figure 2-6 Virginia Town Development Plan, 2014 - 2020 26
Figure 2-7 County Development Plan 2022 - 2028, Virginia 27
Figure 2-8 Location of Virginia along the M3/N3 Dublin to Cavan Route 30
Figure 2-9 Speed limit and cross section inconsistencies 34
Figure 2-10 N3 National Primary Road (Volume to Capacity Ratio) 35
Figure 2-11 RSA Collision Data (2005 – 2016) for all years and all collision types 38
Figure 2-12 RSA Collision Data (2005 – 2016) for collisions involving pedestrians 38
Figure 2-13 N3 Sections used in Collision Analysis 40
Figure 2-14 Network Safety Ranking 2014 – 2016 data 41
Figure 3-1 Study Area 43
Figure 3-2: LAM Highway Network 47
Figure 3-3: Disaggregated N3 Zone System 48
Figure 3-4 Stage 2 Option Corridors 52
Figure 3-5 Stage 2 Option Variants 52
Figure 3-6 Journey Time Routes 55
Figure 3-7 Type 2 Dual Carriageway Cross Section 57

Figure 4-1 Study Area 60
Figure 4-2 Combined Constraints 66
Figure 5-1 Multi-Modal Options Assessed using NIFTI 72
Figure 8-1 Stage 1 Options & Links 90
Figure 8-2: Stage 1 Options Assessed in Step 2 115
Figure 8-3 Proposed Stage 2 Options 121
Figure 9-1 Stage 2 Option Corridors 124
Figure 9-2 Stage 2 Option Variants 125
Figure 9-3 Do-Minimum & Option A Alignments 125
Figure 9-4 2016 Pobal HP Deprivation Index Categories ('By Small Area') within the Study Area 178
Figure 9-5 Extract from CLÁR Map (County Cavan) 179
Figure 9-6 - Irish Rail Intercity Network 182
Figure 9-7 TEN-T Core and Comprehensive Network in the North and Border Region 189
Figure 9-8 Popular walking routes around Virginia 194
Figure 9-9 Corridor Widening at Southern End of Option Cv2 200
Figure 9-10 Corridor Widening at Northern End of Option Cv2 201
Figure 9-11 Corridor Widening at Burrencarragh Link Road 201
Figure 9-12 Emerging Preferred Option 202
Figure 10-1 Preferred Option 203
Figure 10-2 Proposed Active Travel extents and connectivity 207
Figure 10-3 Proposed Connectivity at the Southern End of Scheme 207
Figure 10-4 Proposed Connectivity at Virginia 208
Figure 10-5 Proposed Connectivity at the Northern End of Scheme 208
Figure 10-6 Extract of the proposed National Cycle Network with Virginia Town noted. 210
Figure 10-7 Public Consultation Drawing of the proposed CycleConnects Network for Cavan 211
Figure 10-8 Extract from Public Consultation Drawing of the proposed CycleConnects Network showing Virginia and Environs 211
Figure 10-9 Extract from Figure 3.1 of the Technical Note for the draft Cavan Cycle Network showing the proposed Active Travel facility associated with the N3 Virginia Bypass scheme 212
Figure 10-10 Population Catchment Area 213
Figure 10-11 Active Travel Benefits 214

List of Plates

Plate 2-1 - Existing N3 between Derver and Maghera (Whitegate village gateway) 30
Plate 2-2 - Existing N3 between Derver and Maghera 30
Plate 2-3 - Existing N3 between Derver and Maghera (Maghera village gateway) 31
Plate 2-4 - Existing N3 in Maghera 31
Plate 2-5 - Existing N3 between Maghera and Virginia (at HD15 site at Burrenrea, in vicinity of Glanbia Ingredients Ireland) 31
Plate 2-6 - Existing N3 between Maghera and Virginia (constrained cross section and roadside hazards) 31
Plate 2-7 - Existing N3 between Maghera and Virginia (constrained cross section and roadside hazards) 31
Plate 2-8 - Existing N3 between Maghera and Virginia (direct accesses) 31
Plate 2-9 - Existing N3 within Virginia Town (R178 to Bailieborough traffic signals) 32
Plate 2-10 - Existing N3 within Virginia (town centre) 32
Plate 2-11 - Existing N3 within Virginia Town (R194 junction to Ballyjamesduff) 32
Plate 2-12 - Existing N3 within Virginia (north of town centre) 32
Plate 2-13 - Existing N3 north of Virginia (HD15 site at Murmod Cross) 32
Plate 2-14 - Existing N3 north of Virginia (at Lisgrea Cross) 32
Plate 2-15 - Existing Traffic Queues along N3 Northbound towards Virginia Town. (≈3km from town at Burrenrea) 36
Plate 2-16 - Existing Traffic Queues along N3 Northbound towards Virginia Town. 36

List of Tables

Table 2-1 Regional and Local roads intersecting the N3 33
Table 2-2 Type of Road and Capacity at a Level of Service “D” 36
Table 2-3 Average Traffic Collisions by section 39
Table 2-4 Local Collision Rates 39
Table 3-1 Stage 2 Options and Option Variations 50
Table 3-2 Matrix Totals 2028 Opening Year 53
Table 3-3 Matrix Totals 2043 Design Year 53
Table 3-4 2043 AADT Values 56
Table 3-5 Type of Road and Capacity at a Level of Service “D” 56
Table 4-1 Constraints Identified in the Study Area 61
Table 5-1 Shortlisted Demand Management Measures 70
Table 5-2 Assessment of Alternatives MCA Summary 73
Table 6-1 Impact scoring system used in the appraisal of Options during Stage 2 77
Table 7-1 Public Consultation 1 Feedback 80
Table 7-2 Results from Mode of Transport Question 80
Table 7-3 Public Consultation 2 Feedback 81
Table 7-4 Public Consultation 3 Feedback 84
Table 7-5 List of Consulted Bodies for the N3 Virginia Bypass Scheme 85
Table 8-1 Stage 1 Options & Links 88
Table 8-2 Stage 1 Engineering Assessment Matrix 93
Table 8-3 Stage 1 Environmental Assessment Sub-Criteria 95
Table 8-4 Stage 1 Air Quality and Climate Assessment Summary 97
Table 8-5 Stage 1 Noise and Vibration Assessment Summary 98
Table 8-6 Stage 1 Landscape and Visual Assessment Summary 99
Table 8-7 Ecological Valuation Criteria (adapted from NRA 2009) 99
Table 8-8 Designated Conservation Areas Impacted by Stage 1 Options 101
Table 8-9 Ecological Sites Impacted by Stage 1 Options 101
Table 8-10 Stage 1 Ecology Assessment Summary 103
Table 8-11 Stage 1 Planning and Development Assessment Summary 104
Table 8-12 Stage 1 Geology Assessment Summary 104
Table 8-13 Stage 1 Archaeological, Architectural and Cultural Heritage Assessment Summary 105
Table 8-14 Stage 1 Residential/Private Property – Summary 106
Table 8-15 Stage 1 Residential Garden Impact – Summary 106
Table 8-16 Stage 1 Community Impact – Summary 107
Table 8-17 Corridor Option Value Rating 107
Table 8-18 Corridor Option Impact Rating 108
Table 8-19 Impact category and MCA 109
Table 8-20 Stage 1 Agricultural Impact – Summary 109
Table 8-21 Stage 1 Environmental Assessment Matrix 110
Table 8-22 Stage 1 Economy Assessment Scores 112
Table 8-23 Step 1 Options Elimination 113
Table 8-24 Options and Links Eliminated in Step 2 115
Table 8-25 Stage 1 Assessment Matrix Summary 119
Table 8-26 Naming and Colour Changes of Corridor Options 120
Table 9-1 Stage 2 Options and Option Variations 122
Table 9-2 NDP Cost Category 127
Table 9-3 Impact scoring of options in terms of Transport Efficiency and Effectiveness 128
Table 9-4 Impact scoring of options in terms of Wider Economic Impacts 129
Table 9-5 Economy Appraisal – Impact Scores Summary Table 131

Table 9-6 Impact scoring of options in terms of Collision Reduction 132
Table 9-7 Option comparison Table from Road Safety Audit Stage F Part 1 132
Table 9-8 Impact scoring of options in terms of RSIA 134
Table 9-9 Safety Appraisal – Impact Scores Summary Table 135
Table 9-10 Stage 2 Environmental Appraisal Sub-Criteria 136
Table 9-11 Summary of Index of Overall NOx and PM_{10} Exposure for each Option 138
Table 9-12 Air Quality Assessment Summary 139
Table 9-13 Option Comparison Based on 3 Elements of 'Route Corridor Selection' (TII, 2004) 143
Table 9-14 Stage 2 Noise and Vibration Assessment Summary 145
Table 9-15 Stage 2 – Expected Number of Landscape Receptors 147
Table 9-16 Stage 2 – Expected Number of Visual Receptors 147
Table 9-17 Stage 2 Landscape and Visual Assessment Summary 148
Table 9-18 Assessment of Options with regards to various Ecological Parameters 149
Table 9-19 Ecological Sites Impacted by Stage 2 Options 150
Table 9-20 Scoring for Options for Various Ecological Parameters 152
Table 9-21 Stage 2 Biodiversity Assessment Summary 153
Table 9-22 Waste Appraisal of Corridor Options 155
Table 9-23 Stage 2 Waste Assessment Summary 155
Table 9-24 Soils & Geology – Metrics and Impact Weightings 156
Table 9-25 Stage 2 Soils and Geology Assessment Summary 159
Table 9-26 Stage 2 Hydrology Assessment Summary 163
Table 9-27 Hydrogeology Impact Scores 166
Table 9-28 Stage 2 Hydrogeology Assessment Summary 166
Table 9-29 Summary Quantification Breakdown of Cultural Heritage Receptors within 300m Corridors 169
Table 9-30 Stage 2 Cultural Heritage Assessment Summary 170
Table 9-31 Stage 2 Material Assets – Non-Agricultural Assessment Summary 173
Table 9-32 Information Sources 174
Table 9-33 Stage 2 Agricultural Assessment Summary 176
Table 9-34 Environment Appraisal – Impact Scores Summary Table 177
Table 9-35: Impact Score of Options in terms of Deprived Geographical Areas 179
Table 9-36: Accessibility & Social Inclusion Appraisal – Impact Scores Summary Table 181
Table 9-37 Transport Integration - Performance Scores Summary Table 185
Table 9-38 Land Use Integration - Performance Scores Summary Table 188
Table 9-39 Geographical Integration - Performance Scores Summary Table 190
Table 9-40 Regional Balance - Performance Scores Summary Table 192
Table 9-41 Integration Appraisal - Impact Scores Summary Table 192
Table 9-42 Physical Activity Appraisal – Impact Scores Summary Table 195
Table 9-43 Stage 2 Project Appraisal Matrix 197
Table 10-1 PABS Environmental Sub-Criteria Summary 204
Table 10-2 PABS Summary 214
Table 10-3 Preferred Option Vs Project Objectives 219

SECTION 1: INTRODUCTION AND DESCRIPTION

1.1 General

Virginia Town and its environs experiences a level of both local and through traffic using the N3 that is contributing to congestion within the town centre, which is compounded by the relatively large number of Heavy Goods Vehicles (HGVs) passing through the town and making deliveries within the town. This has contributed to poor safety and environment for non-motorised users, in particular vulnerable road users (VRUs). VRU safety and environment has been deteriorating within Virginia town centre and its environs, with shorter and intra-town trips that are more conducive to walking and cycling being discouraged and displaced with the prevailing traffic condition. In addition, several sections of the N3 in and around Virginia have been identified as High Collision Locations, with 4 fatal collisions and 10 serious injury collisions noted in the period 2012 – 2016.

In September 2019, Cavan County Council appointed JB Barry Transportation Ltd, trading as Barry Transportation, as Technical Advisors to provide the Engineering, Environmental, Economic and Appraisal services required to develop a scheme to address the safety, congestion and environmental concerns that exist as a result of the high volume of traffic travelling along the N3 through Virginia Town and the settlements of Maghera and Whitegate, and to successfully deliver the Scheme through the Planning and Design Phases 1 to 4 inclusive in accordance with the TII Project Management Guidelines. The project is named the 'N3 Virginia Bypass' scheme, hereafter also referred to as the 'Project' or the 'Scheme' in this report.

The purpose of this Phase 2 Option Selection Report is to consider and assess various alternatives and options to resolve the problems identified above and identify a preferred transport solution for the scheme. These alternatives and options include public transport, demand management, active modes and road alternatives.

The N3 Virginia Bypass scheme will aim to be consistent with National, Regional and Local Policies by:

- Enhancing Regional Accessibility and enhance connectivity and improve the resilience of the transportation of people, goods and services;
- Reducing traffic through Virginia Town and the settlements of Maghera and Whitegate to enable improvement of the public realm environment and to facilitate improvements for walking and cycling that will provide a safer and healthier environment conducive to active travel;
- Improving journey time reliability for all travel modes, including road based public transport, within and through Virginia Town, and the settlements of Maghera and Whitegate; and
- Supporting sustainable and equitable mobility to encourage modal shift to help meet Irelands Climate Change goals,
- Supporting a transition to sustainable mobility by considering provision of:
  - Active Travel infrastructure, incorporating pedestrian and cycle facilities; and
  - Transport Park and Share Hubs (mobility hubs), that will provide for parking to safe bus stops and facilitate more carpooling for longer onward journeys, with EV charging facilities.

In December 2019, Cavan County Council prepared and issued the Phase 1 Gate Review Statement to Transport Infrastructure Ireland (TII) and sought their approval to proceed to Phase 2, Options Selection. On 20th December 2019 the TII confirmed approval to proceed to Phase 2 of the N3 Virginia Bypass scheme.

The Scheme was therefore advanced to Phase 2 Option Selection.

The Phase 2 Option Selection process essentially comprises the identification of a Study Area, the identification of constraints within that Study Area, consideration and assessment of various transport solutions, alternatives and 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) of this Report.

The Option Selection Report has been divided into the following volumes:

- Volume 0 – Executive Summary
- Volume 1 – Main Report (i.e., this Report)
- Volume 2 – Drawings
- Volume 3 – Constraints Study Report
- Volume 4 – Phase 2 Stage 1 Assessment Appendices
- Volume 5 – Stage 2 Environmental Appraisal Report
- Volume 6 – Engineering Appendices
- Volume 7 – Project Appraisal Balance Sheet

With reference to Figure 1-1, TII's Project Management Guidelines (PMGs) provide a framework for an eight-phase process to the management, development and delivery of National Road and Public Transport Capital Projects in Ireland. The Option Selection Report describes the planning and design work undertaken to the end of Phase 2 (Option Selection) of the Scheme.

Figure 1-1: TII's Project Management Guidelines Project Phases (Excerpt from TII's PMGs)

1.2 Description of the Existing Network

Cavan County is served by its road network only. There are no operational railway lines in Cavan. The nearest functional rail connections are in Longford, Edgeworthstown and Mullingar, a minimum distance of 46km from Virginia. A freight line runs from Drogheda to Navan, approximately 38km from Virginia, serving the Tara Mines site. The existing rail infrastructure cannot provide the connectivity or the strategic access that the current road network provides. A review of Irish Rail's 2030 Rail Network Strategy (October 2011) does not propose any reinstatement of the disused Mullingar to Cavan line.

The M3 motorway and N3 National Primary Route form the strategic radial corridor linking Dublin with Cavan and onward to Enniskillen and beyond to the Regional Growth Centres of Sligo and Letterkenny. The M3 motorway extends from Clonee (at the Co. Dublin / Co. Meath border) to the north side of Kells. From Kells the N3 continues in a northwest direction along a Type 2 Dual Carriageway for approximately 9.5km which terminates at Derver (at the Co. Meath / Co. Cavan border). See Figure 1-2 below.

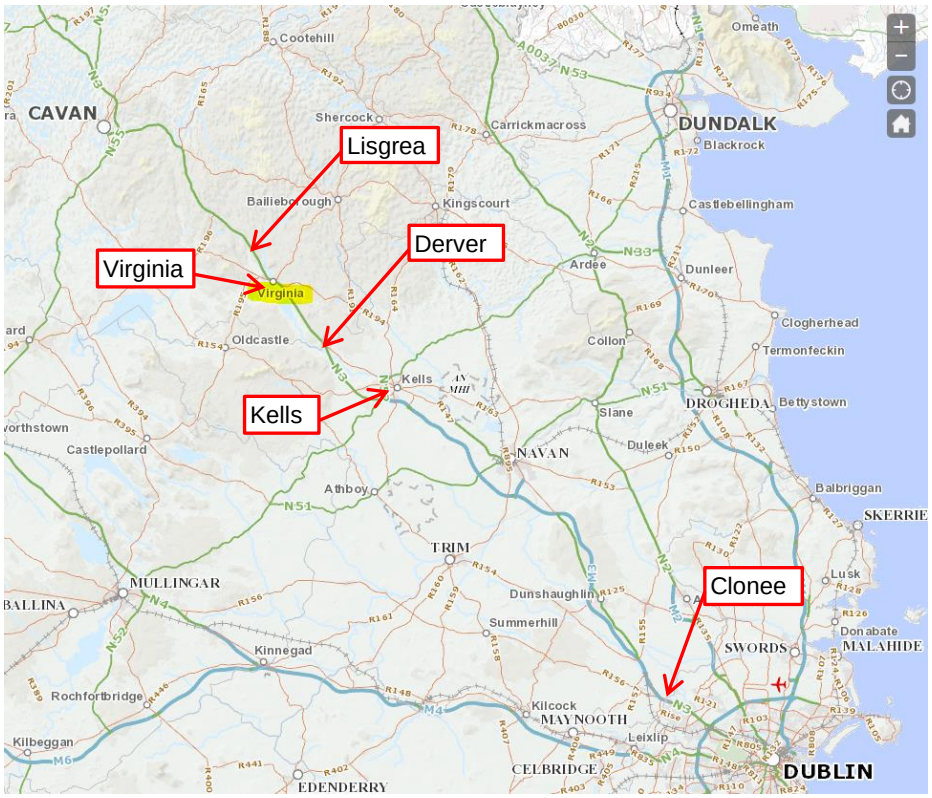


Figure 1-2 Location of Virginia along the M3/N3 Dublin to Cavan Route

Virginia is the last remaining town on the N3 National Route between Dublin and the Northern Ireland border which has not been bypassed. Removal of the existing congestion through Virginia will greatly improve the regional connectivity to the North-West which is a strategic priority of the National Planning Framework (Project Ireland 2040).

North of Derver, the N3 comprises a single carriageway cross section and for approximately 4km between Derver and Maghera the cross section is a single carriageway with hard shoulders. The section of N3 north of Maghera as far as the south side of Virginia, has a reduced cross section with narrow hard strips and boundary hedges and walls close to the carriageway. It also has poor horizontal and vertical alignment with severely restricted overtaking opportunities. The N3 continues through Virginia Town, where significant congestion through the town occurs especially during the AM and PM peak periods. The traffic congestion through Virginia Town also results in poor safety and environmental conditions for Vulnerable Road Users (VRUs) and discourages sustainable active travel modes. For approximately 1.5km to the north side of Virginia, the N3 remains as a narrow, undulating single carriageway without hard shoulders until Cornaslieve where the cross-section changes again to that of a single carriageway with hard shoulders, which continues to Cavan Town and beyond.

At the start of Phase 2 (Options Selection), an updated study area was established. The study area for the scheme commences near the end of the Type 2 dual carriageway at Woodpole/Jonesborough, Co. Meath, approximately 9km northwest of Kells and extends to the north of Virginia Town and north of Lisgrea Cross thus comprising a mainline length of ≈16.5km (when measured along the existing N3), see Figure 1-3 below.

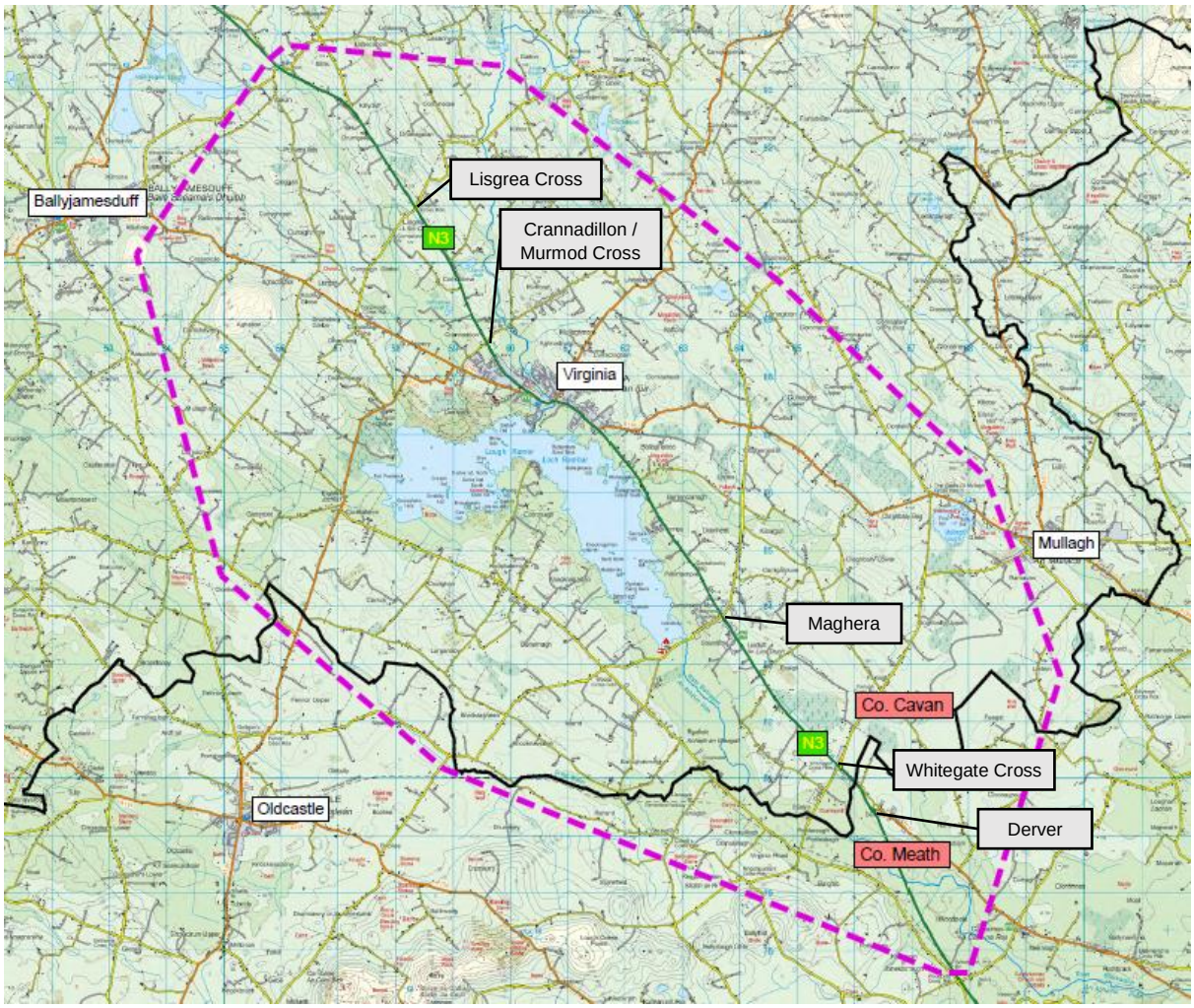


Figure 1-3 Scheme Study Area (at Phase 2)

1.3 History of the Project and Previous Scheme Development

The need for a bypass of Virginia was initially identified by Cavan County Council in the 1980's and was included as an indicative alignment in the Cavan County Development Plan of 1996. A bypass of Virginia was formally acknowledged nationally by its inclusion in the National Road Needs Study (1998) by the National Road Authority (NRA). The formal development of a scheme was initiated by the NRA and Cavan County Council in 2000.

Over the past twenty plus years, the following three Virginia Bypass schemes were proposed, each reaching various stages of development prior to suspension:

- Virginia Bypass (2003);
- Virginia Bypass as a 2+1 scheme (2004 - 2007); and
- N3 Edenburt to Cavan (2+2 scheme) (2008 - 2012).

1.3.1 Virginia Bypass (2003)

A 9.2km long N3 Virginia Bypass was granted planning permission by Cavan County Council pursuant to a Part 8 planning application in 2003. Cavan County Council has been protecting the route corridor from development since October 2003.

A location map showing the route of the Virginia Bypass which was granted Part 8 Planning in 2003 is shown in Figure 1-4 below:

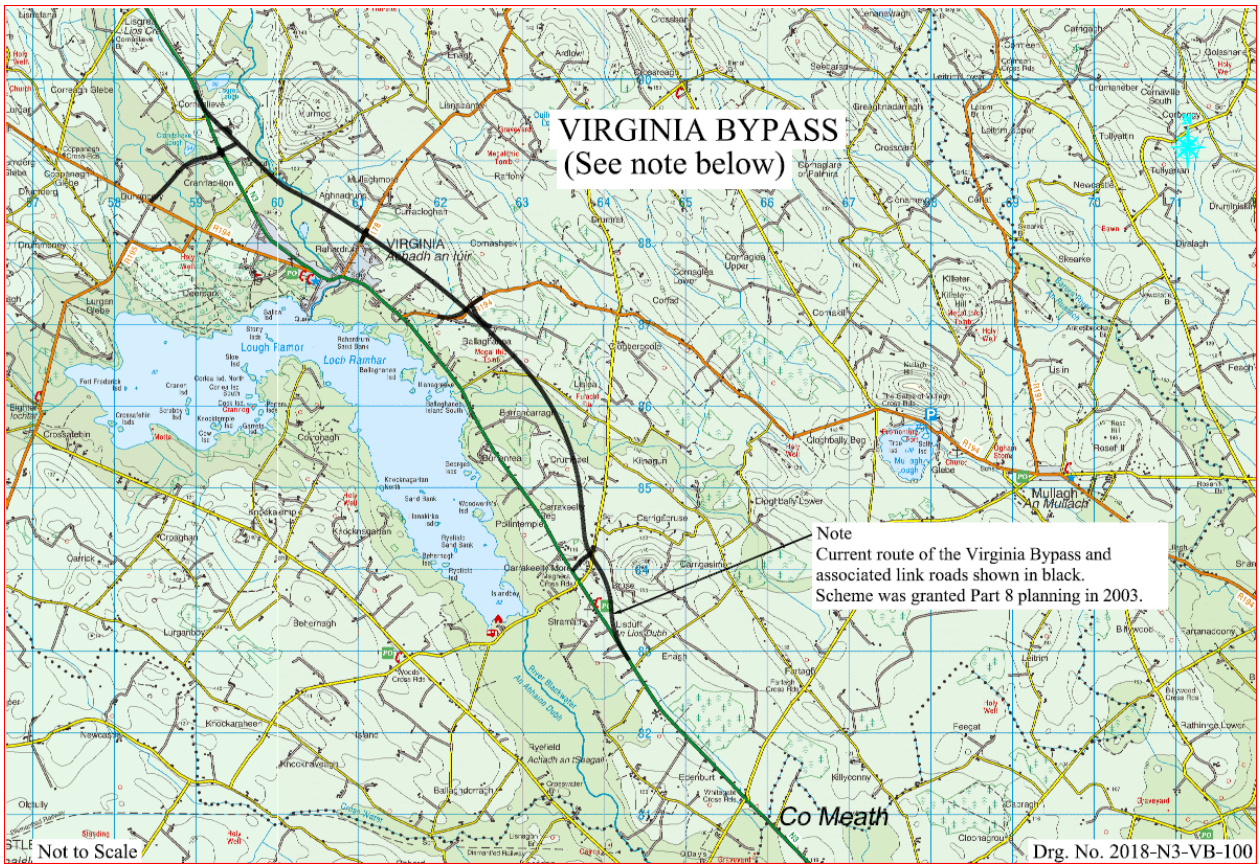


Figure 1-4: N3 Virginia Bypass (2003)

This scheme was initiated by the National Roads Authority in 2000 and the following work was completed:

- Phase 2 - Route Options Selection for the scheme was completed in 2002;
- Phase 3 - Design and Environmental Evaluation for scheme was completed in 2003 and Part 8 Planning was approved on 13th October 2003; and
- Phase 4 - Statutory Process documentation was completed and made ready for lodgement with An Bord Pleanála, but the scheme was suspended.

The following reports were prepared by RPS-MCOS Consulting Engineers working on behalf of Cavan County Council:

- Constraints Report (2003)
- Route Selection Volume 1 – Report (2003)
- Route Selection Volume 2 – Appendix A (2003)
- Route Selection Volume 3 – Appendix B (2003)
- Preliminary Report Book 1 – Report (2003)
- Preliminary Report Book 2 – Appendices (2003)
- Preliminary Report Book 3 – Maps/drawings (2003)
- Environmental Impact Report – Main Report (2003)
- Environmental Impact Report – Technical Appendices (2003)
- Ground Investigation Report
- Part 8 Planning Description of Proposed Scheme (2003)
- Part 8 Planning – Location Maps and Schedules (2003)
- Compulsory Purchase Order Book 1 – Deposited Maps (2003)
- Compulsory Purchase Order Book 1 – Deposited Maps & Schedules (2003)
- Compulsory Purchase Order Book 1 – Serving Maps (2003)
- Supplementary Preliminary Report (July 2005)

This proposed scheme recommended two types of carriageway cross section. The majority of the carriageway (8.5km) was Wide Single Carriageway with the remainder (0.7km) Standard Single Carriageway.

The proposed scheme commenced approximately 1km south of Maghera Crossroads, bypassing Maghera Crossroads and Virginia Town before tying back into the existing N3 in the townland of Cornaslieve, approximately 2km north of Virginia Town. A proposed R194 link connected the existing R194 Ballyjamesduff Road to the proposed bypass providing a necessary link for vehicles wishing to gain access to the R178 Bailieborough Road and the proposed bypass without the need to travel through Virginia Town.

This scheme was suspended prior to lodgement of the Statutory Process documentation in 2003. In July 2004 Cavan County Council requested RPS-MCOS Consulting Engineers to carry out the following:

- Re-examine the junction at the R178 Bailieborough Road;
- Re-assess accommodation works at Murmod;
- Re-assess the Noise Impact of the scheme; and
- Develop a proposal for the N3 Virginia Bypass as a 2 plus 1 road scheme. The scope of this feasibility examination extending from the Meath / Cavan County boundary to Cornaslieve.

A Supplementary Report was prepared by RPS Consulting Engineers in July 2005 based on the above matters. This report stated that the Virginia Bypass was considered to be somewhere between single carriageway and dual carriageway in terms of capacity, cost and safety. The Supplementary Report concluded that the N3 Virginia Bypass scheme was suitable for a 2 + 1 (Type 3 Dual Carriageway) scheme and that the section of the existing N3 between Maghera and the Meath/Cavan County Boundary could be retrofitted to a 2 + 1 scheme. The current TII Publication (Standards) for Rural Road Link Design[1], specifies this road type primarily for retrofit projects.

1.3.2 Virginia Bypass as a 2 + 1 scheme (2004 - 2007)

In 2008 RPS-MCOS prepared a draft Preliminary Design Report based on the conclusions from the 2005 Supplementary Report. This report developed the 2 + 1 scheme concept to upgrade the existing N3 between Maghera and the Cavan/Meath County Boundary from single lane carriageway to a 2 + 1 scheme.

Phase 3 of the Project Management Guidelines (Design and Environmental Evaluation) was completed in 2005/2006 for a 2 + 1 road type but the scheme was suspended.

1.3.3 N3 Edenburt to Cavan (2+2 Type 2 Dual Carriageway scheme) (2008 - 2012)

In 2008 the National Roads Authority requested Cavan Country Council to reassess the N3 Virginia Bypass as part of a larger strategic project. The proposed project was to develop a scheme on the N3 from the Cavan/Meath border to Cavan Town i.e., the Edenburt to Cavan Bypass Scheme.

A Project Brief was prepared by Cavan County Council and the Meath National Roads Design Office. This report was submitted to the NRA (TII) in 2009 and concluded that there was a need for this scheme based on:

- Increasing Traffic Volumes;
- High collision rates;
- Maintaining consistency with strategic transport policies, the 2007-2013 National Development Plan (NDP) and Cavan County Council Development Plans;
- Removal of long-distance traffic and improved cross-border linkages; and
- Improved accessibility and Social inclusion.

[1] TII Publications (Standards) DN-GEO-03031 (June 2017) “Rural Road Link Design”

A Constraints Study for this scheme was completed in September 2009 and a draft constraints report is on file. The purpose of the Constraints Study was to identify any feature or issues that could affect the design, delay the progress or influence the cost of the N3 Edenburt to Cavan Bypass Scheme and to accumulate relevant background information in this regard.

A number of route options were developed and the 11 highest ranked options were brought forward, see Figure 1-5 for options considered. A Traffic Model and Cost Benefit Analysis (COBA) was prepared and a stage 2 Project Appraisal of the 11 route options was partially completed.

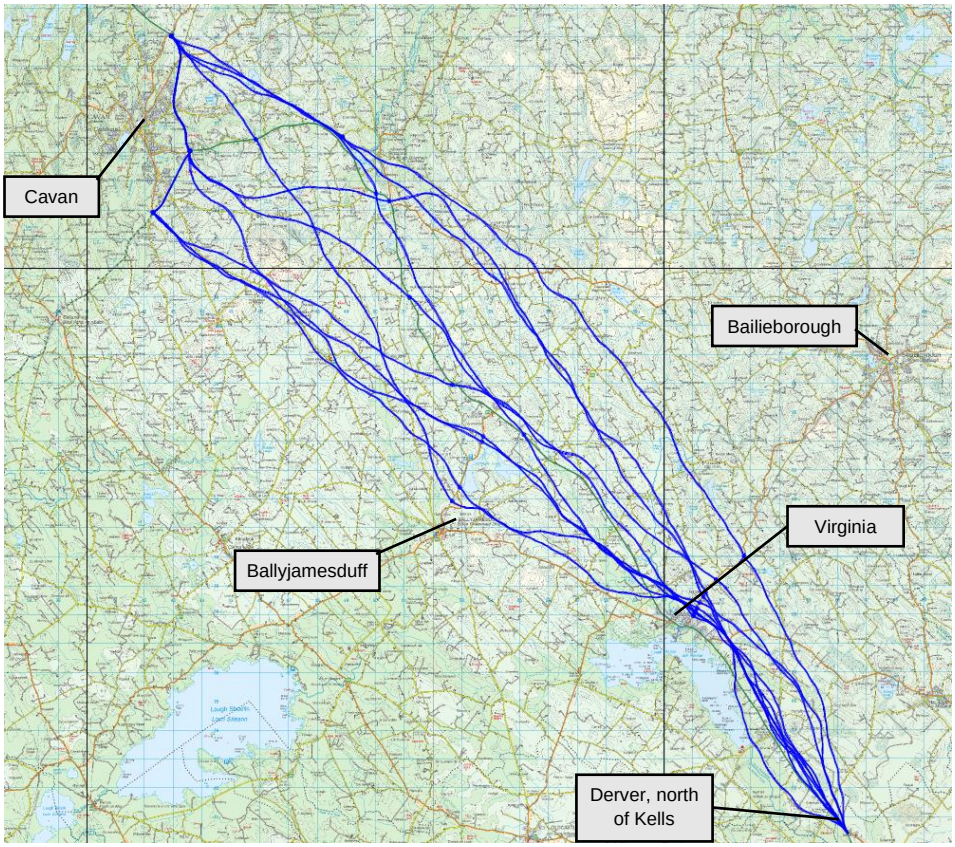


Figure 1-5 Route Options Considered for N3 North of Kells to Cavan scheme

The scheme was suspended prior to completion of the Route Selection process in November 2012. The scheme remains suspended and has not been included in the current National Development Plan (2021 – 2030).

Following the closure of the Meath NRDO, Cavan County Council obtained agreement from the NRA (TII) in March 2014 for Donegal NRDO to carry out a review of the Route Selection process to date. A Route Selection Status Report was produced in July 2014 outlining the works necessary to complete the Route Selection Process. This report concluded that the Route Selection Process was only 40 – 50 % complete.

1.4 Purpose of the Option Selection Report

The purpose of the Option Selection Report is to present the project constraints, to consider and assess various alternatives and options, including public transport, demand management, active modes and road alternatives, and identify a preferred transport solution for the scheme. The Option Selection Report is the main deliverable for Phase 2.

The Option Selection process for the N3 Virginia Bypass scheme has been undertaken in accordance with Project Management Guidelines (PMGs) PE-PMG-02041 (December 2020), TII's Project Manager's Manual (PMM) for Major National Road Projects PE-PMG-02042 (February 2019) and TII's Project Appraisal

Guidelines (PAG) for National Roads. The design was undertaken in accordance with the requirements of the TII Design Standards. These documents hereafter will be referred to as the TII Publications.

Information is presented in this Report (and its accompanying volumes) to provide clarity on the decision-making process which has resulted in the selection of a Preferred Option. Where possible, this Report is a non-technical summary of the detailed technical and scientific information collated as part of Phase 2. The detailed technical and scientific information is included in the accompanying volumes of this Report.

The TII Publications sets out the implementation of the first three stages of the option selection process leading to the selection of the Preferred Option. This process is illustrated in Figure 1-6 below.

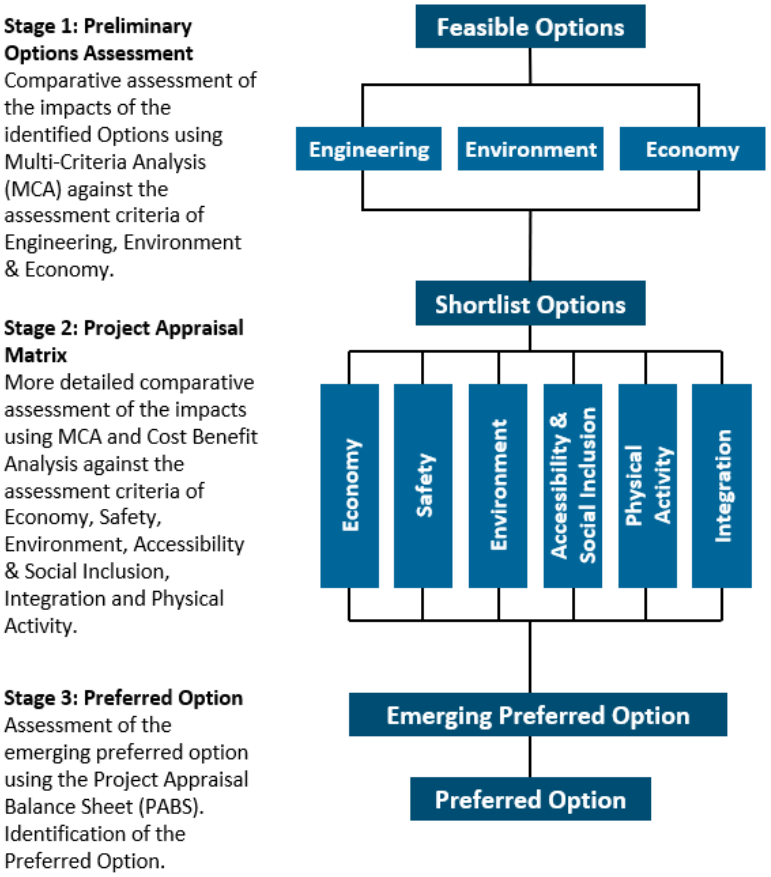


Figure 1-6 TII's Phase 2 Three Stage Option Selection Process as outlined in TII Publications

1.5 Scheme Objectives

It is noted that the Scheme Objectives were originally established during Phase 0 Scope and Pre-Appraisal Project Appraisal Plan (September 2018) for the proposed Scheme. The objectives were subsequently reviewed and updated at Phase 1 and further developed as part of the Phase 2 Option Selection Process. These objectives are presented below.

Objectives for transport schemes should be a local implementation of the government's overarching transport objectives (Economy, Safety, Environment, Accessibility & Social Inclusion, Integration and Physical Activity) as set out in the Department of Transport Common Appraisal Framework (CAF), updated in October 2021. The Scheme Objectives for the proposed Scheme under the six CAF criteria headings are outlined below.

1.5.1 Economy

Scheme Specific Objective	KPI	Measurable
To be consistent with the National Planning Framework objective of enhancing regional accessibility and enhance connectivity between the 4 cities and the Northern and Western region.	• Minimise unnecessary delays along the N3 between Dublin and Cavan and beyond • Improve journey time reliability for all modes of transport	• Consistency of journey times through the day
To promote and grow the Northern and Western regional economy by creating better transport linkage for people, goods and services, including road based public transport, between Dublin, Cavan and onward to the Northern and Western region.	• Improve journey times and journey time reliability for all modes of transport	• Consistency of journey times through the day • Bus, HGV and private car journey times • Measurement of queue lengths along N3 approaching Virginia (pre and post construction)
Improve attractiveness for inward investment and employment in the Virginia, Cavan and the North West Region through improved transport network efficiency and connectivity, including Public Transport and Active Travel connectivity.	• Improve journey times and journey time reliability for all modes of transport • Reduction in congestion in Virginia Town • Facilitate improved urban realm – including outdoor seating areas, better environment for pedestrians and cyclists. • Increased uptake in public transport and Active Travel • Reduction in number of people commuting out of County Cavan	• Reduction in vehicles, and HGV traffic in particular, from the town centre • Measurement of journey times • Surveys post construction to determine increase in public transport usage, walking and cycling • Survey of commuter volumes pre construction and 5 years and 10 years post construction
Provide a scheme at an investment cost that offers good value for money.	• Positive Cost Benefit Ratio	• BCR measured

1.5.2 Safety

Scheme Specific Objective	KPI	Measurable
To improve road safety by reducing the rate and severity of collisions on the road network and to support the RSA Road Safety Strategy to reduce road deaths and serious injuries by 50% by 2030	• Reduction in traffic volumes including HGVs within Virginia Town and environs • Reduction in rat running on unsuitable local roads • Reduction in number, frequency and severity of collisions	• Traffic surveys, pre and post construction, to determine quantity of traffic, including HGVs, removed from the town and environs • Measurement of collision rates on N3 and other routes within study area (pre and post construction)
To improve safety for vulnerable road users.	• Provide physical infrastructure for VRUs • Removal of strategic traffic, including HGVs, travelling through the town	• Calculate length of facilities • Quantity of Traffic, including HGVs removed from the town • Surveys post construction to determine volumes of Active Travel users

1.5.3 Environment

Scheme Specific Objective	KPI	Measurable
To improve the environment in Virginia Town through the reduction of through / strategic traffic	• Reduction in congestion and traffic volumes including HGVs within the town • Improvement in air quality • Reduction in traffic noise levels in Virginia Town.	• Traffic surveys, pre and post construction, to determine quantity of traffic, including HGVs, removed from the town and environs • Air Quality “Index of Change” in NOx and PM10 concentrations. • Pre and post construction noise surveys
To support sustainable development principles and measures to minimise effects on the environment including potential climate change effects	• Efficient use of on-site materials to minimise import of natural resources from off-site	• Earthworks balance to minimise import of earthworks materials • Quantity of processing of unacceptable material to make acceptable for use on-site • Quantity of excavated earthworks materials deposited on site vs disposed to licenced facility offsite
To protect and enhance biodiversity including both legally protected areas and other areas	• Strive for no net loss of biodiversity • Protect important ecological habitats • Restore, where feasible, important ecological habitats.	• Measure potential for impact on designated sites • Monitoring of the mitigations proposed (pre and post construction surveys)
To reduce pollutants and heavy metals from road surface water drainage from entering watercourses, Lough Ramor pNHA and into the River Boyne and River Blackwater	• Provide pollution control measures on the drainage network. • Major Reduction in traffic, including HGV traffic on	• Measurement of water quality along key watercourses and their outfalls within Lough Ramor (pre and post construction)

Scheme Specific Objective	KPI	Measurable
Special Area of Conservation (SAC) and Special Protected Area (SPA), supporting the Water Framework Directive objective for Lough Ramor to restore Good Quality status.	uncontained existing drainage network will considerably reduce polluted runoff (hydrocarbon, etc).	• Traffic surveys, pre and post construction, on existing road network including adjacent to Lough Ramor
To support sustainable and equitable mobility to encourage modal shift to help meet Irelands Climate change goals	• Provide active travel and transport park and share hubs (mobility hubs) infrastructure • Provide active travel and private car connectivity to bus stops and transport park and share hubs (mobility hubs) • Provide EV charging facilities within the transport park and share hubs (mobility hubs)	• Calculate length of facilities • Surveys pre and post construction to determine increase in walking and cycling and Public Transport usage • Quantity and usage of public EV charge points (pre and post construction)

1.5.4 Accessibility & Social Inclusion

Scheme Specific Objective	KPI	Measurable
Improve journey time reliability for all travel modes including bus public transport between Virginia Town, Cavan Town and the North West Region	• Improve journey time reliability for all modes of transport	• Consistency of journey times through the day
To improve accessibility for all, in particular vulnerable groups and those in deprived areas, to key facilities such as: • employment, including access to remote working hubs, • education, • health care, • and other essential services, within Virginia Town, Cavan Town, the North West Region and Dublin.	• Improvement in journey times and journey time reliability for all modes of transport • Increased uptake in public transport, walking and cycling	• Consistency of journey times and journey time reliability through the day • Surveys post construction to determine increase in public transport usage, walking and cycling
Improve quality of life in towns and communities by: • removing strategic and commercial traffic from Virginia Town • reducing rat running of traffic on the unsuitable local road network.	• Reduction in traffic volumes, including HGVs, within Virginia • Reduction of traffic volumes along unsuitable roads that currently experience rat running	• Traffic surveys, pre and post construction, to determine quantity of traffic, including HGVs, removed from Virginia and other unsuitable routes

1.5.5 Integration

Scheme Specific Objective	KPI	Measurable
To facilitate active travel and road connectivity with public transport interchanges, e.g. bus stops and transport park and share hubs (mobility hubs).	• Provide transport park and share hubs (mobility hubs) • Increased uptake in public transport	• Surveys post construction to determine increase in public transport usage and car pooling
To support sustainable development through the provision of appropriate access and adherence to the principles of compact urban growth	• Compliance with national, regional and local plans and policies, e.g. Town Centre First policy and tackling vacancy, dereliction and to revitalise town centres • Interface scheme with other national and local schemes	• Measure quantity of vacant properties on Virginia main streets pre construction and 5 and 10 years post construction • Quantity of direct linkages with other facilities / schemes, eg, linkages to Active Travel facilities in Virginia, Maghera and the like; links with bus stops / transport park and share hubs (mobility hubs); links with the National Cycle Network
To improve transport links between Dublin, including Dublin Port and Dublin Airport, Cavan, the Border and the North-West Region.	• Improvement in journey time reliability for all modes of transport	• Consistency of journey times through the day
Improve connectivity for movement around the town and between local communities, including Maghera, for all transport modes, including pedestrians and cyclists	• Improvement in journey times of all modes of transport • Increased uptake in public transport, walking and cycling	• Surveys post construction to determine increase in public transport usage, walking and cycling

1.5.6 Physical Activity

Scheme Specific Objective	KPI	Measurable
Reduce strategic traffic through Virginia Town to enable improvement of the public realm environment and to facilitate improvements for safe walking and cycling and provide a healthier environment conducive to active travel	• Reduction of congestion and traffic volumes including HGVs within the town and other settlements along the N3 • Improvement in air quality and reduction in noise pollution through traffic reduction	• Reduction in vehicles from town centre and surrounding settlements • Air Quality “Index of Change” in NOx and PM10 concentrations • Pre and post construction noise surveys
To provide improved connectivity for Vulnerable Road Users (VRUs) to key destinations eg Schools, workplaces, Virginia Town, Virginia Primary Care Centre, tourist facilities, sports complexes and Lough Ramor amenity, village centres).	• Provide physical infrastructure for VRUs • Reduction in traffic at key access locations to Lough Ramor (i.e. N3 and R194 Ballyjamesduff Road)	• Calculate length of facilities • Traffic surveys, pre and post construction, on existing road network adjacent to Lough Ramor

1.6 Design Strategies

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

- **Step 1 – Identification of Scheme Objectives:** As per Section 1.5 above, the Phase 1 Scheme Objectives were reviewed and updated in line with current policies.
- **Step 2 – Identification of Study Area:** As outlined in Section 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 (See Section 4).
- **Step 4 – Consideration of Alternatives and Options:** Taking the traffic assessment and identified constraints into account, all reasonable / feasible options (Including the Do-Nothing Option, Do-Minimum Option, Do-Something Option, Public Transport Alternative and the Demand Management Option), were considered and assessed (See Section 5).
- **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 Design Standards. A Non-Statutory Public Consultation was undertaken on these initial feasible Options selected for Phase 2 Stage 1 Preliminary Option Selection. Furthermore, this Consultation provided an opportunity for the public to add any known constraints in addition to those identified in step 3 above.
- **Step 6 – Appraisal of Options:** The options were appraised in accordance with TII three stage systematic appraisal process as identified previously in Figure 1-6. Throughout this process, the development of the options was refined. Another Non-Statutory Public Consultation was undertaken on the shortlisted option corridors selected for Phase 2 Stage 2 Project Appraisal Matrix.
- **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, a Non-Statutory Public Consultation was held. Additional information received during the Public Consultation was reviewed, and where applicable, utilised in the assessment of the Emerging Preferred Option, to develop a Project Appraisal Balance Sheet (PABS) to summarise the benefits and impacts associated with the option. The results of the assessment were used to determine if the Emerging Preferred Option would become the Preferred Option.

SECTION 2: IDENTIFICATION OF NEED

2.1 Strategic Fit and Priority of the Project

The proposed Scheme and its objectives are consistent and compatible with the following, national, regional and local policy documents, and other relevant policy documentation, which are listed below and outlined in the section below.

- European Policy – Trans-European Transport Network (TEN-T) Network Policy.
- National Policy – Project Ireland 2040 (National Planning Framework 2040 and the National Development Plan 2021 – 2030), National Investment Framework for Transport in Ireland (NIFTI), Town Centre First Policy, Climate Action Plan 2021[2] and Climate Action and Low Carbon Development Acts 2015 to 2021, TII Sustainability Implementation Plan – Our Future, Ireland's National Waste Policy 2020-2025, National Biodiversity Action Plan 2017-2021, Road Safety Authority (RSA), Road Safety Strategy, 2021-2030, National Sustainable Mobility Policy, National Roads Needs Study 1998.
- Regional Policy – Regional Spatial and Economic Strategy – Northern and Western Region 2020.
- Local Policy – Cavan County Development Plan 2014-2020, Draft Cavan County Development Plan 2022-2028[3], Meath County Development Plan 2021-2027.

2.2 Development Policy

As outlined in the sections below, it is considered that the N3 Virginia Bypass scheme and its objectives align with current national, regional and local policy documents. Section 2.2.1 below summarises the scheme and the potential to support European Policy.

2.2.1 European Policy Context

TEN-T Network Policy

The Trans-European Transport Network (TEN-T) is a European Commission policy directed towards the implementation and development of a Europe-wide network of roads, railway lines, inland waterways, maritime shipping routes, ports, airports and rail-road terminals. On the 11th of December 2013 Regulation (EU) No 1315/2013 came into effect. This defines and provides legal guidance for the provision of the Trans European Transport Network (TEN-T).

TEN-T consists of two planning layers:

- Core transport network; and
- Comprehensive transport network.

The core network in Ireland forms part of 1 of 9 major transport corridors, which is referred to as the North Sea-Mediterranean Corridor. This corridor stretches from Ireland to the north of France, the Netherlands, Belgium and Luxembourg and south to the Mediterranean Sea in the south of France.

The TEN-T Core Network is supported by a Comprehensive Network of routes, feeding into the Core Network at regional and national level. The target for completion of the Comprehensive Network is 2050.

[2] Climate Action Plan 2023 was published following the preparation of all Phase 2 reports. All Phase 3 analysis and reporting will be informed by the latest national policy (i.e Climate Action Plan 2023 or equivalent).

[3] Subsequent to the development of this report, the Cavan County Development came into effect on July 11th 2022.

Figure 2-1 below highlights the extent of both the Core and Comprehensive Transport Networks in relation to roads, ports and airports within the North East / Border Region of Ireland.

While the N3 Virginia Bypass scheme does not form part of the TEN-T network, it will improve linkage and connectivity from Dublin and Cork to the TEN-T comprehensive network route between Sligo, Enniskillen and Belfast (N16/A4/M1 corridor) and between Sligo, Letterkenny and Derry (N15/N14/N13 corridor).

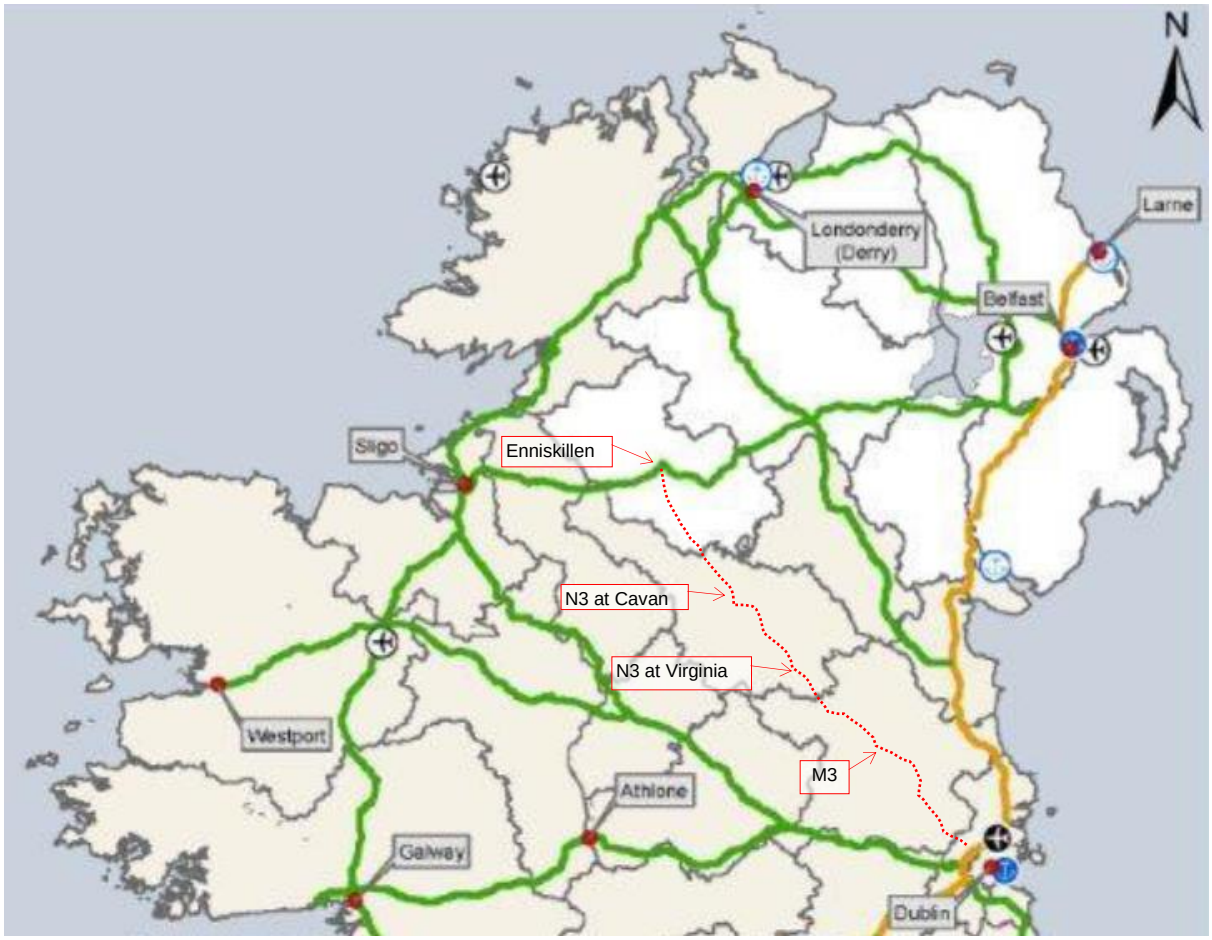


Figure 2-1 TEN-T Core and Comprehensive Transport Network in the North and Border Region[4]

2.2.2 National Policy Context

Project Ireland 2040: Building Ireland's Future

Project Ireland 2040 is the government's overarching policy framework for future development and investment in Ireland. It comprises two principal documents, namely, the National Planning Framework 2040 and the companion document, the National Development Plan 2021 – 2030.

National Planning Framework (NPF) 2040

The National Planning Framework (NPF) – Project Ireland 2040 was published by the Government in February 2018. The NPF is the principal national planning policy document for the country. The purpose of the document is to create the conditions to successfully accommodate growth and positive change by facilitating a shift towards Ireland's regions and cities other than Dublin, while also recognising the ongoing

[4] Proposed updates to the Ten-T policy, yet to be adopted, will exclude the UK from the Ten-T network.

critical role of the country's Capital. Chapter 10 of the NPF includes a list of 'shared goals' across the country framed as 10 National Strategic Outcomes (NSOs):

- NSO 1 – Compact Growth;
- NSO 2 – Enhanced Regional Accessibility;
- NSO 3 – Strengthened Rural Economies and Communities;
- NSO 4 – Sustainable Mobility;
- NSO 5 – A Strong Economy Supported by Enterprise, Innovation and Skills;
- NSO 6 – High-Quality International Connectivity;
- NSO 7 – Enhanced Amenities and Heritage;
- NSO 8 – Transition to a Low Carbon and Climate Resilient Society;
- NSO 9 – Sustainable Management of Water and other Environmental Resources;
- NSO 10 – Access to Quality Childcare, Education and Health Services.

Under the framework three regional assemblies have been identified: Eastern & Midland, Northern & Western and Southern. Virginia in County Cavan is part of the Northern and Western Region Assembly. Each of the assemblies is illustrated in Figure 2-2 below.

Figure 2-2 NPF Configuration of the Regional Assemblies in Ireland

The framework states the following with respect to the achievement of 'Enhanced Regional Accessibility':

"A co-priority is to enhance accessibility between key urban centres of population and their regions. This means ensuring that all regions and urban areas in the country have a high degree of accessibility to Dublin, as well as to each other. Not every route has to look east and so accessibility and connectivity between places like Cork and Limerick, to give one example, and through the Atlantic Economic Corridor to Galway as well as access to the North-West is essential".

Chapter 10 of the NPF establishes more detail on the 10 National Strategic Outcomes, including the following extracts which the Scheme would help to achieve:

- That the achievement of **Compact Growth** is contingent on, inter alia, improving accessibility to and between centres of mass and scale and better integration with their surrounding areas and to ensure a transition to more sustainable modes of travel (walking, cycling, public transport) within an urban context;
- **Enhanced Regional Accessibility**. Better accessibility between the four cities and to the Northern and Western region will enable unrealised potential to be activated as well as better preparing for potential impacts from Brexit, with a general focus on "maintaining the strategic capacity and safety of the national roads network including planning for future capacity enhancements" and "improving average journey times targeting an average inter-urban speed of 90 kph". In addition, improving accessibility to the North-West shall be achieve by "Upgrading northern sections of the N4 and N5 routes and sections of the N3/M3 national primary route, and improving Public Transport by strengthening "public transport connectivity between cities and large growth towns in Ireland and Northern Ireland with improved services and reliable journey times";
- That actions for the **Strengthened Rural Economies and Communities** includes investment in regional and local roads and the delivery of "strategic road improvements to ensure access to critical services such as education, healthcare and employment". In addition, "investment in greenways, blueways and peatways as part of a nationally coordinated strategy" including the National Cycle Network that will facilitate safe rural walking and cycling routes, has demonstrated major potential to bring new life to regional and rural locations through the "win-win" scenario of increased tourism activity and healthier travel;
- That the provision of a well-functioning, integrated transport system is a key cornerstone of **Sustainable Mobility** enhancing competitiveness, sustaining economic progress. This must include attractive public transport to reduce congestion and emissions and cater for longer term population and employment growth. In addition, develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate;
- That a **Strong Economy Supported by Enterprise, Innovation and Skills** is based on critical components such as supporting productivity, attracting inward investment and international connectivity;
- That the achievement of **High-Quality International Connectivity** to airports and ports will be directly shaped by improved land transport, including road connectivity, to these assets.

The realisation of National Strategic Outcomes in the NPF is dependent on the delivery of a number of focused National Policy Objectives which include measures to focus 50% of future population and employment growth in Ireland's five cities and complementing this by means of "improved accessibility between centres of scale separate from Dublin, to ensure that levels of service (travel times per km) between the Capital and Irelands cities and larger distributed centres are replicated and on key east-west and north-south routes". This is enshrined in National Policy Objective 2c:

"Accessibility from the north-west of Ireland and between centres of scale separate from Dublin will be significantly improved, focused on cities and larger regionally distributed centres and on key east-west and north-south routes".

Chapter 3 of the NPF establishes the key parameters for effective regional development. The primary identified challenge for the Northern and Western Region is:

"identification and implementation of actions that will build up its urban structure, diversify and strengthen its rural areas as they transition towards a more broadly based mix of economic activities sufficient to underpin long term self-sustaining local communities. This will be complemented by improved accessibility".

"Addressing economic resilience and connectivity will be strategic priorities for this area. The maintenance of seamless cross-border movement for people, goods and services, together with improvements in digital and physical infrastructure will create new opportunities to leverage employment and for sustainable

population growth, focused on the county towns. Enhanced connectivity would result in this area being strategically located almost equidistant between the Dublin, Belfast and Derry City regions in terms of time, as well as distance".

The N3 Virginia Bypass will improve connectivity by reducing journey times and improving journey time reliability. This in turn will make Cavan and the North-West region a more attractive place to set up business and improve the economic resilience of the county and the region. It will also benefit existing businesses by reducing transport times and costs. The scheme will also facilitate a transition to sustainable mobility with the provision of the following:

- Active Travel infrastructure, incorporating pedestrian and cycle facilities; and
- Transport Park and Share Hubs (mobility hubs), that will provide for parking to safe bus stops and facilitate more carpooling for longer onward journeys, with EV charging facilities and with safe HGV rest parking areas.

National Development Plan (NDP) 2021 to 2030

The National Development Plan (NDP) sets out the investment priorities that will underpin the successful implementation of the NPF 2040.

The National Development Plan (NDP) 2021-2030 was launched in October 2021 and is the most recent in the series of such capital plans adopted since 1988.

The NDP contains expenditure commitments for a range of strategic investment priorities which have been determined by the relevant Departments as central to the delivery of the NPF vision. Within the revised NDP, considerable investment is identified for Active Travel with prioritisation then focussed on Public Transport and then Private Transport. The N3 Virginia Bypass is listed in the NDP as a national road project which is subject to further approvals.

The NDP emphasises the essential requirement to enhance and upgrade accessibility between urban centres of population and their regions, in parallel with the initiation of compact growth of urban centres. This has a crucial role to play in maximising the growth potential of the regional urban centres and the economy as a whole. The Plan allocates €35 billion of the €165 billion investment to transport related priorities to 2031.

The N3 Virginia Bypass aligns with the NDP priorities by removing strategic traffic from Virginia Town and thereby increasing reliability and journey times on the public transport system while improving safety on the National Road Network. Removing the strategic traffic, including HGVs, from the town centre and the settlements of Whitegate and Maghera will help achieve a more comfortable and safer environment when walking or cycling to and from work, home, school, shops and leisure. The inclusion of Active Travel measures and the proximity of the scheme to the town, which encourages compact growth, as well as the inclusion of the Transport Park and Share Hubs (mobility hubs) to facilitate the transition to sustainable mobility, further aligns with the priorities of the NDP.

National Investment Framework for Transport in Ireland (NIFTI)

The Department of Transport's National Investment Framework for Transport in Ireland (NIFTI) was published in December 2021. NIFTI is the Department of Transport's strategic framework for future investment decision making in land transport. It will guide transport investment in the years ahead to enable the National Planning Framework, support the Climate Action Plan and promote positive social, environmental and economic outcomes throughout Ireland. At the core of this is a recognition that Ireland's transport system faces competing policy priorities and that a framework is needed to support decision making and achieve an appropriate balance between objectives.

For future transport investment to support the delivery of the NPF and address the challenges it faces, it will be necessary to give priority to certain types of investment over others. NIFTI establishes four Investment

Priorities: Decarbonisation, Protection and Renewal, Mobility of People and Goods in Urban Areas, and Enhanced Regional and Rural Connectivity, as presented in Figure 2-3.

Figure 2-3 NIFTI Investment Priorities

Decarbonising the transport sector is an urgent priority in the context of Irelands climate change targets and NIFTI recognises the importance of this challenge by setting out to prioritise sustainable modes of Active Travel and Public Transport over less sustainable modes such as the private car, see Figure 2-4. NIFTI also recognises that the private car will remain an important mode of travel for much of Ireland and recognises the importance to support the transition to low-emission vehicles and develop associated infrastructure to help decarbonise such trips.

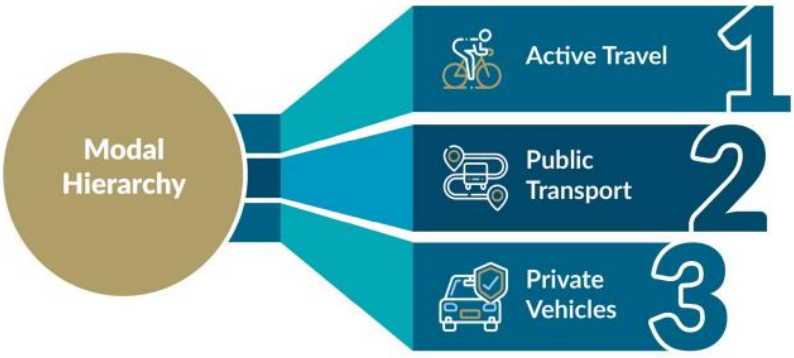


Figure 2-4 NIFTI Modal Hierarchy

NIFTI has developed a hierarchy of four intervention types to make best use of the existing asset and to ensure that investment is proportionate to the problem identified, see Figure 2-5.

Figure 2-5 NIFTI Intervention Hierarchy

Maintaining the existing transport network will be given first priority, followed by maximising the value of the network through optimising its use. Infrastructural investments will only be considered after these two categories have been assessed as inappropriate for the identified problem, with upgrades to existing infrastructure to be considered before new infrastructure.

To ensure alignment with NIFTI, an Assessment of Alternatives was undertaken that demonstrated that Active Travel and Public Transport alone, as well as maintaining, optimising and improving the existing N3, will not resolve the traffic congestion and unsafe environment for VRUs in Virginia and in the settlements of Maghera and Whitegate. The proposed N3 Virginia Bypass scheme seeks to provide high-quality offline infrastructure with active travel facilities that will support a shift to sustainable mobility and ease congestion through the town and with the removal of significant numbers of HGV traffic, will enable a safer environment for walking and cycling within the town and its environs.

Town Centre First Policy

In February 2022, the Government published the 'Town Centre First' policy. Aligned with the National Planning Framework, this policy aims to tackle vacancy, dereliction and to revitalise town centres making them more attractive places to live, work, socialise and run a business. In relation to public realm and transport modes, the Town Centre First policy recognises that successful places:

- Are characterised by an attractive public realm (streets, spaces and parks) that is designed to invite people to meet, mingle and dwell;
- Are well connected and accessible to sustainable modes of transport, enabling a high proportion of journeys to be made by foot and /or bicycle from the immediate hinterland (e.g. the '10 minute town' concept);
- Manage traffic within central areas so that streets prioritise vulnerable users (pedestrians and cyclists), enabling them to move about safely and in comfort.

The completion of the N3 Virginia Bypass scheme will ensure a reduction in traffic congestion and traffic noise levels, and improvement in air quality in Virginia and its environs, due to the removal of strategic traffic, including HGVs, along the N3 through Virginia Town, Maghera and Whitegate. This will improve the public realm in the town centre and make the town more amenable for other modes of transport. The local authority will work closely with local community groups, retailers and the other members of the Town Teams in devising and delivering on the objectives of their respective masterplans. Cavan County Council considers Virginia to be a high priority for future Town Centre First Masterplan Initiatives, and the benefits of the N3 Virginia Bypass scheme will help contribute to and ensure the success of any such Masterplans.

Zero Pollution Action Plan, Climate Action Plan 2021[5] and Climate Action and Low Carbon Development Acts 2015 to 2021

The European Commission adopted the EU Action Plan: 'Towards a Zero Pollution for Air, Water and Soil' on 12th May 2021 which is a key deliverable of the European Green Deal. The main objective for the zero-pollution vision for 2050 is to reduce air, water and soil pollution to levels that are not considered harmful to health and natural ecosystems. This is also translated into key 2030 targets to speed up reducing pollution at source. The action plan provides a compass to mainstream pollution prevention in all relevant EU policies, to step up implementation of the relevant EU legislation and to identify possible gaps.

The key policy areas listed in the Plan that are relevant to the proposed Scheme are Air, Circular Economy, Marine and Coastal Environment, Nature and Biodiversity, Noise, Soil and Land, and Water. To ensure that the proposed Scheme does not lead to levels of air, water and soil pollution that are considered harmful; mitigation measures will be adopted in further stages. These will also be laid out in an Outline Construction Environmental Management Plan (Outline CEMP) to ensure reduced risk of pollution on site.

The Climate Action and Low Carbon Development (Amendment) Bill 2021 was signed into Law by the President on 23 July 2021. The 2021 Act establishes a 2050 net-zero emissions target for Ireland, with the introduction of 5-year, economy-wide carbon budgets starting in 2021. In addition, it introduces a requirement to annually revise the Climate Action Plan. Following the enactment of the Climate Action and Low Carbon Development Act 2015, the Government published the first Climate Action Plan in June 2019. The second Climate Action Plan was published in November 2021 after the 2021 Act. This plan builds on measures and technologies set out in the 2019 plan to deliver greater ambition. The objective of the Plan is to enable Ireland to meet its EU targets to reduce its carbon emissions by 30% between 2021 and 2030 with the ultimate objective of achieving a transition to a climate resilient, biodiversity rich and carbon neutral economy no later than 2050.

The Plan sets out measures to deliver targets for all sectors of the economy including Transport. Section 15.3 of the Plan outlines measures to deliver targets in the transport sector. These are Sustainable Mobility, System Efficiency and Demand Management, Fleet Electrification, Transitional Measures: Renewable and Alternative Transport Fuels, and Horizon Actions.

In addition to the transport sector, road projects cross into the Circular Economy Sector, where measures are outlined for the prevention, recycling/reuse, and diversion of waste, and the Land Use, Land Use Change, Forestry and the Marine Sector, where impact to existing land types (forestry, bogs, etc.), which store carbon and other greenhouse gases, is considered.

Regarding the 'Sustainable Mobility' measure in the Climate Action Plan 2021, the proposed Scheme seeks to support and promote sustainable transport, which will encourage a modal shift from individual vehicle usage. As identified in Section 2.3 of this Report, the existing rural sections of the N3 have no formal pedestrian and cycle facilities. The proposed Scheme seeks to provide continuous dedicated cycle and pedestrian facilities throughout the length of the scheme, with links to the existing local road network where feasible, with the aim of encouraging a modal shift to this sustainable transport mode within the Study Area.

In relation to a modal shift to public transport, the existing and future public transportation within the Study Area is limited to road-based bus transportation. By increasing capacity and improving the journey times and journey time reliability, the proposed Scheme seeks to support the integration and growth of bus transportation in the Study Area, with the integration of transport park and share hubs (mobility hubs) into the scheme that will include safe bus stops and EV charging facilities, with the aim of encouraging a modal shift to sustainable transport modes.

[5] Climate Action Plan 2023 was published following the preparation of all Phase 2 reports. All Phase 3 analysis and reporting will be informed by the latest national policy (i.e Climate Action Plan 2023 or equivalent).

Regarding 'Circular Economy', the proposed Scheme will seek to maximise the re-use of waste (including earthworks) and aim to reduce the amount of disposal of material. An Outline Construction Environmental Management Plan (Outline CEMP) and Resource and Waste Management Plan (RWMP) will be developed in the next phase of the Scheme development, which will identify measures to manage material resources, to reuse non-hazardous soils and aggregates from excavation and demolition, and, where feasible, measures to minimise greenhouse gases associated with the importation of materials. In terms of existing land use, the proposed Scheme will seek to limit the land take required for the Scheme, and the associated impacts to land types (bogs, forestry, etc.).

In terms of TII's response to the challenges of climate change, TII's Environmental Strategy (February 2019) recognises the importance of decarbonising transport and ensuring that road infrastructure is resilient to climate change. TII's Strategy for Adapting to Climate Change on Ireland's Light Rail and National Road Network (December 2017) outlines general resilience measures to be considered for its road network. As part of the future development of the proposed Scheme, impacts due to extreme weather events and temperatures will be considered in the design and assessment of the Scheme, including flood risk and drainage design. The proposed Scheme will be designed to mitigate the impacts to the surrounding environment and to the road infrastructure itself due to these ever-increasing climatic events/conditions.

In conclusion, it is considered that the proposed Scheme and its associated Scheme Objectives align with the Climate Action Plan 2021.

TII Sustainability Implementation Plan – Our Future

TII recently developed their 'Sustainability Implementation Plan – Our Future'. The plan provides the foundation for the development of all future sustainability initiatives in TII as well as providing a platform for stakeholder engagement and reporting.

The six guiding principles of sustainability below describe how the TII will deliver a sustainable future through their work. They principles are the product of internal consultation, external collaborations and horizon scanning.

- **Principle 1: Provide effective, efficient and equitable mobility**: The proposed Scheme will enhance regional connectivity across the North-West region and hence support the integrated development of remoter parts of this region, which is a key priority of the National Planning Framework (Project Ireland 2040). One of the key outcomes of the Scheme is expected to be improvement in journey times and journey time reliability for all modes of transport resulting in efficient journeys, effective connectivity and increased accessibility.
- **Principle 2: Enable safe and resilient networks and services**: The N3 through Virginia is characterised by congestion, frequent direct accesses and poor junctions. The Scheme proposes to reduce congestion and remove significant HGV movements through the town that will improve safety and environment for vulnerable road users. The proposed Scheme will be designed to be resilient and mitigate the impacts to the surrounding environment and to the road infrastructure itself due to the ever-increasing climatic events/conditions.
- **Principle 3: Collaborate for a holistic approach**: The Scheme ensures proper collaboration with stakeholders to understand wider impacts and benefits and deliver sustainable outcomes. The Common Appraisal Framework criteria used for options appraisal cover all three pillars of sustainability; environment, economy and society; ensuring a holistic approach.
- **Principle 4: Deliver end-to-end improvements**: The Scheme will assess best options for resource waste management and circular economy to enhance whole-life-cycle value of the project. Detailed measures will be prepared in further stages of the Scheme to minimise waste to be transported off-site and ensure resource waste management.
- **Principle 5: Transition to net zero**: A key criteria in option appraisal is carbon assessment which deals with calculating carbon emissions for the design phase. The Scheme will also take into account carbon emissions associated with construction and operational phases in further stages of the project.
- **Principle 6: Create total value for society**: The Scheme objectives are framed along the six Common Appraisal Framework criteria of economy, safety, environment, accessibility and social inclusion,

integration, and physical activity. This will ensure balanced delivery of the Scheme with robust planning, rigorous appraisal and decisions focused on sustainability.

The N3 Virginia Bypass scheme will work towards aligning with these principles as discussed above.

A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025

The Waste Action Plan for a Circular Economy is Ireland's new roadmap for waste planning and management. It sets out a range of aims and targets for the State and the measures by which these will be achieved, including increased regulation and measures across various waste areas like Circular Economy and Construction and Demolition (C&D).

As stated above, the Scheme will assess best options for resource waste management and circular economy to enhance whole-life-cycle value of the project. Detailed measures will be prepared in further stages of the Scheme to minimise waste to be transported off-site and ensure resource waste management. Management of C&D waste poses a major challenge in construction projects. However, improvements in C&D waste management practices can also offer many opportunities in terms of reduced environmental and financial costs to the industry. A Resource and Waste Management Plan will be prepared in the next stages of the Scheme to identify activities that will generate waste and to outline how the waste will be dealt with.

National Biodiversity Action Plan 2017-2021

The National Biodiversity Action Plan (NBAP) 2017-2021, the third such plan for Ireland, captures the objectives, targets and actions for biodiversity that will be undertaken by a wide range of government, civil society and private sectors to achieve Ireland's Vision for Biodiversity.

Objective 1 of the Plan is to 'Mainstream biodiversity into decision-making across all Sectors', and includes the following actions relevant to the proposed Scheme.

1.1.2. Public and Private Sector relevant policies will use best practice in SEA, AA and other assessment tools to ensure proper consideration of biodiversity in policies and plans.

1.1.3. All Public Authorities and private sector bodies move towards no net loss of biodiversity through strategies, planning, mitigation measures, appropriate offsetting and/or investment in Blue-Green infrastructure.

Biodiversity and ecology are key assessment criteria during all phases of the Scheme appraisal and design. This includes assessment of impacts on Natura 2000 Sites, NPWS designated Sites and Key Ecological Receptors across the Study Area. Ecological surveys are conducted through different phases to collect baseline information for detailed assessment. In the next phases as the detailed design develops, the possibility of Biodiversity Net Gain measures will also be assessed.

Overall, the Scheme will ensure that any impacts on ecological sites are avoided as much as possible and mitigation measures are developed for any residual impacts.

Road Safety Authority (RSA), Road Safety Strategy, 2021-2030

Ireland has set a target to reduce road deaths and serious injuries by 50% by 2030, in line with the EU. Ireland's long-term goal is achieving Vision Zero (i.e. zero road deaths or serious injuries) by 2050.

The Road Safety Strategy seeks to reduce the number of fatalities and injuries on our roads through a Safe System approach. The focus of the 2013–2020 strategy was to 'move towards' the Safe System approach while the 2021–2030 strategy will formally embed the Safe System approach into national road safety, policy and practice. It states that:

"*A focus on road design for speed management, forgiving roadsides and ensuring the required funding for road maintenance and new investment programmes in line with Safe System principles will be key to achieving our target reductions in fatalities and serious injuries*."

The Safe System principles are:

- Human error,
- Strengthened systems,
- Human frailty,
- Shared responsibilities.

It is considered that the N3 Virginia Bypass scheme will align with and support the Safe System approach of the Road Safety Strategy through the provision of a high-quality multi-modal transport solution which implements forgiving roadsides and includes off-road cycle and pedestrian facilities that provide a significantly improved level of segregation within the proposed development.

National Sustainable Mobility Policy

The National Sustainable Mobility Policy, published in April 2022, builds on and replaces the existing sectoral policy documents that were published in 2009: Smarter Travel – A Sustainable Transport Future 2009 – 2020, and the National Cycle Policy Framework. The core purpose of the national sustainable mobility policy is to get people out of private cars and to use public transport, bicycles or walk by focussing on making active travel or public transport the most attractive option for travel.

The national sustainable mobility policy is centred around three guiding principles:

- **Safe and Green Mobility** which sets out actions to ensure mobility safety, expand on sustainable mobility in rural and regional areas and encourage people to choose sustainable mobility over the private car.
- **People Focused Mobility** which sets out how to make sustainable mobility options accessible to everyone, particularly people with reduced mobility.
- **Better Integrated Mobility** which looks at better integrated sustainable transport and land-use planning, as well as examining smart transport solutions.

The N3 Virginia Bypass scheme will remove a significant volume of vehicular traffic, including HGVs, from the N3 through Virginia Town and its surrounds. This will result in a much safer environment for pedestrians and cyclists and will enable opportunities for Cavan County Council to provide much improved facilities for vulnerable road users. The inclusion of active travel facilities along the proposed bypass alignment will also encourage safe, integrated, sustainable mobility and help decarbonise the environment within Virginia Town and its environs.

National Roads Needs Study 1998.

The bypass of Virginia was identified in the National Roads Needs Study 1998 as a high priority Phase 1 need, i.e. to be implemented between 2000 and 2004.

2.2.3 Regional Strategy and Guidelines

The regional assemblies came into being on the 1st January 2015 following the enactment of the Local Government Reform Act 2014. The Northern and Western Regional Assembly (NWRA) is one of three Regional Assemblies establish following the enactment of the Local Government Reform Act 2014. It is a function of the Assemblies to prepare a Regional Spatial and Economic Strategy setting out a strategic development framework for the regions. In October 2017, the Minister for Housing, Planning and Local Government directed that the three Regional Assemblies commence the preparation of the Regional Spatial and Economic Strategies for their individual regions, as a replacement to the Regional Planning Guidelines (RPGs) 2010 -2022.

Regional Spatial and Economic Strategy - Northern and Western Region

The Regional Spatial and Economic Strategy (RSES) for the Northern and Western Region came into effect on 24th January 2020. The document is positioned as an implementing strategy for the NPF, supporting the programme for change set out in Project Ireland 2040.

The Central Border Region: Project Ireland 2040 sets out a clear strategy to develop strong urban centres in the North West and the North East. Within the Central Border Region, it confirms it will be crucial that County Towns and economic drivers such as Cavan Town continue to expand seamless cross border links, and these will be aided by the upgrade of the **N3**, including the **bypassing of Virginia** in South County Cavan.

Under the Regional Policy Objectives for national roads, (RPO 6.7), the **N3 Virginia Bypass** is referenced as a scheme that shall be progressed through pre-appraisal and early planning in the short term and shall thereafter proceed to construction and be delivered to an appropriate level of service within the lifetime of the RSES.

Section 3.9 of RSES "Other Places of Strategic Potential" identifies Virginia as performing important regional functions for employment, housing and services, with Virginia as the hub for east Cavan. Virginia is referenced as one of the main economic drivers for wider highly populated catchments, where commuting out of the counties is an issue that needs to be addressed by providing employment and support services. Virginia is strongly positioned to attract businesses, that need access to the Belfast/Dublin corridor, available talent, quality of life and housing.

2.2.4 Local Policy Context

Planning and development policy for Virginia is principally set out in three documents. The Cavan County Development Plan 2014 - 2020 establishes strategic land use objectives including population targets for each of the main settlements in the county. The Draft Cavan County Development Plan 2022 - 2028[6] and the Meath County Development Plan 2021 – 2027 have been prepared in accordance with the provisions of the Planning and Development Act 2000 (as amended).

Cavan County Council Development Plan 2014 – 2020

The Virginia Town development plan, 2014 – 2020, is presented in Figure 2-6 below. The map includes the proposed bypass route as protected from development since it received Part 8 Planning in 2003.

[6] Subsequent to the development of this report, the Cavan County Development Plan came into effect on July 11th 2022.

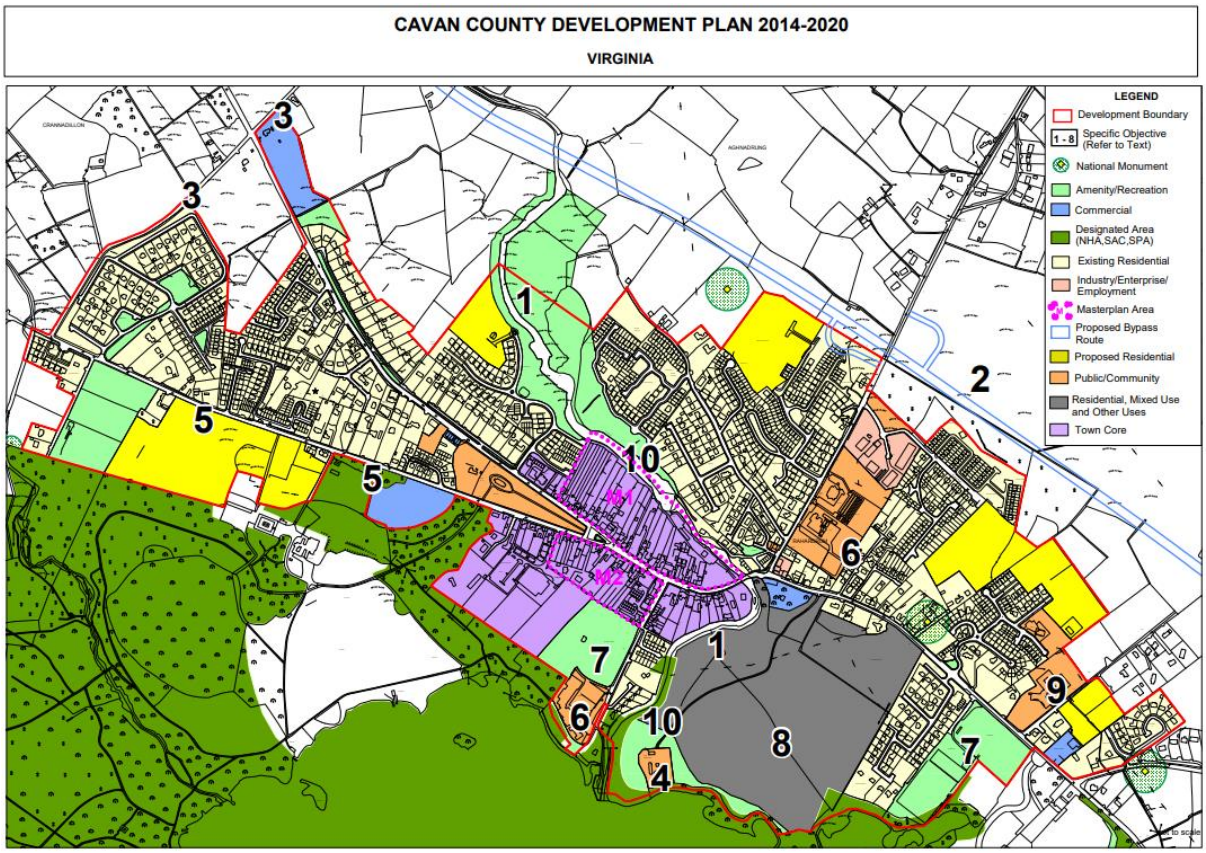


Figure 2-6 Virginia Town Development Plan, 2014 - 2020

The N3 Virginia Bypass scheme will contribute directly to the following objectives of the County Development Plan:

- PIO1 - to improve all Council roads to an appropriate standard subject to the availability of resources.
- PIO2 - to improve road safety for all road users and reduce fatalities and accidents on Cavan Roads.
- PIO3 - to enable people, goods and services to reach their destination safely, efficiently and quickly and to improve access to services in rural parts of Cavan.
- PIO4 - to improve the capacity of the road infrastructure within County Cavan in accordance with national and regional policy.
- PIO6 - To improve access for the mobility impaired.
- PIO7 - To provide safer routes to educational establishments within the County.
- PIO10 - To promote road safety measures in conjunction with Government Departments and other agencies to avoid the creation of traffic hazards and to ensure traffic management and safety issues are adequately addressed at pre-planning and planning application stage.
- PIO22 - To restrict accesses onto National Roads along sections of road where the speed limit exceeds 60km per hour and to restrict the intensification of any existing accesses in such locations, except in exceptional circumstances, as defined by 104 Section 2.6 of the DECLG 'Spatial Planning and National Roads Guidelines,' in line with DECLG policy and as supported by the NRA.

Draft Cavan County Development Plan 2022 - 2028[7]

The draft Cavan County Development Plan 2022 - 2028 was presented for consultation during May to August 2021. The plan was adopted by the elected members of Cavan County Council on May 30th 2022 and will come into effect on July 11th 2022. The Development Plan Zoning Map for Virginia is presented in

[7] Subsequent to the development of this report, the Cavan County Development Plan came into effect on July 11th 2022.

Figure 2-7 below. The map includes the Emerging Preferred Option Corridor for the N3 Virginia Bypass scheme.

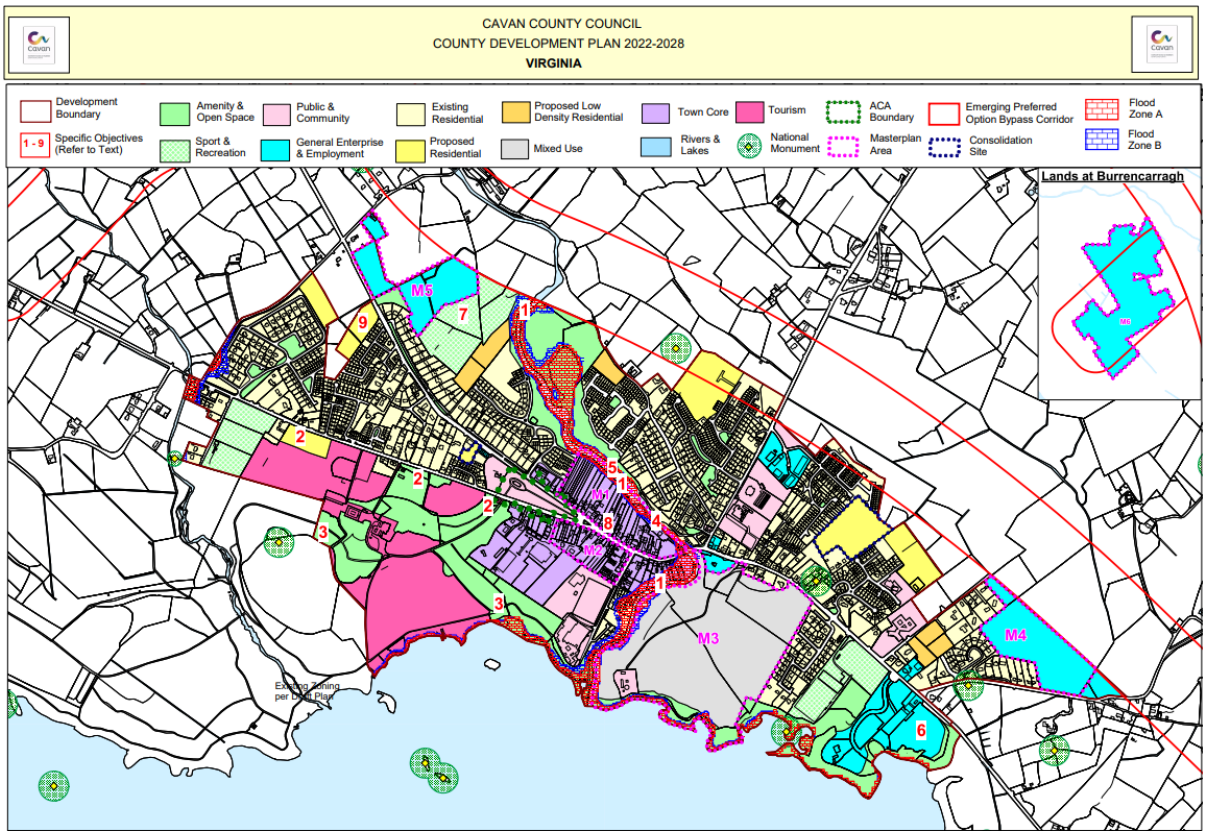


Figure 2-7 County Development Plan 2022 - 2028, Virginia

The new Plan seeks to achieve the following objectives in the county, which align with the proposed Scheme and other sustainable policies:

Virginia Bypass Development Objective

- VB 01 - Work in conjunction with Transport Infrastructure Ireland, Department of Transport and Meath County Council in the planning and construction of the N3 Virginia Bypass Scheme.
- VB 02 - Reserve and protect option corridors from development which would interfere with the delivery of the Virginia By-Pass.

National Road Development Objectives

- NR 01 - Maintain and protect the safety, capacity and efficiency of National roads and associated junctions in accordance with the Spatial Planning and National Roads Guidelines for Planning Authorities, DECLG (2012).
- NR 02 - Protect national roads from inappropriate access in order to protect the substantial investment in the national road network, to preserve the carrying capacity and safety of the National Road Network.
- NR 03 - Support essential national road infrastructure including, bypasses and relief roads for local towns and villages and proposed upgrade and route improvement schemes and, where necessary, reserve the corridors of any such proposed routes free of development, which would interfere with the provision of such proposals.
- NR 04 - Facilitate and carry out improvements to sections of national roads that are deficient in terms of alignment, structural condition or capacity, where resources permit, and to seek to maintain that standard thereafter.
- NR 05 - To protect the capacity, efficiency and safety of the national road network in County Cavan by complying with the 'Spatial Planning and National Roads -Guidelines for planning authorities' (2012).

- NR 06 - Seek to implement the Road Improvement Schemes indicated in table 7.1 and 7.2. The N3 Virginia Bypass is a scheme listed in Table 7.1.
- NR 07 - On urban streets and roads within the 50/60 kmph zone implement the recommendations of the Design Manual for Urban Roads and Streets (DMURS 2019). Within Transition zones on National Roads developments shall conform to 'The Treatment of Transition Zones to Towns and Villages on National Roads.
- NR 08 - Seek to safeguard the capacity and efficiency of the national road network draining systems in County Cavan.

Regional and Local Roads Development Objectives

- RLR 08 - Increase the safety of children at schools by assessing safe routes to schools for school children and by the installation of traffic management measures. Require School Travel Plans to be submitted with applications by schools or colleges in accordance with actions as set out under Smarter Travel, A Sustainable Transport Future 2009-2020.

Active Travel Development Objective

- ACT 01 - Support active travel within the County and the ongoing engagement with the National Transport Authority in the delivery of improvements to the provision and safety of the walking and cycling infrastructure of the County.

Walking and Cycling Development Objectives

- WC 01 - Promote walking and cycling as efficient, healthy and environmentally friendly modes of transport by securing the development of a network of direct, comfortable, convenient and safe cycle routes and footpaths, particularly in urban areas and in vicinity of schools.
- WC 02 - Design pedestrian and cycling and electric bike infrastructure in accordance with the principles, approaches and standards set out in the Transport Infrastructure Ireland Rural Cycleway Design Standard (Offline), National Cycle Manual and the Design Manual for Urban Roads and Streets and international best practice.
- WC 04 - Improve the streetscape environment for pedestrians, cyclists and people with special mobility needs by providing facilities to enhance safety and convenience, including separation for pedestrian infrastructure from vehicular traffic.

Public Transport Development Objective

- PT 01 - Continue to work with the relevant transport providers, agencies and stakeholders to facilitate the integration of active travel (walking, cycling etc) with public transport, thereby making it easier for people to access and use the public transport system.
- PT 02 - Support the operation of existing bus service and facilitate the provision of improved facilities for bus users in towns and villages, including the provision, in collaboration with the relevant agencies, of set down areas for coaches and bus shelters for passengers.
- PT 05 - Assess and determine the potential for bus-based Park and Ride facilities, in particular, close to the N3 National Route, with direct bus links to commuter destinations in the Dublin area.

Virginia Physical Infrastructure Development Objectives

- VI 02 - Support the development of green infrastructure, river walkways and access from amenities to the town centre.
- VI 03 - Co-operate with the relevant authorities in relation to the proposed Virginia by-pass for the Town and support its delivery.
- VI 04 - Commence the preparation of a Local Transport Plan (LTP) for Virginia in conjunction with the National Transport Authority (NTA) and other relevant stakeholders within two years of the adoption of the County Development Plan.

Virginia Economic Development Objectives

- VE 01 - Promote sustainable economic development in Virginia through the promotion of identified economic growth areas which provide employment opportunities locally and reduce the volume of commuting.
- VE 03 - Promote and facilitate the sustainable growth of Virginia as a hub for the east of the County, in terms of economic, housing and services. Support the development of strategic employment lands identified in the Town.

Virginia Sustainable Communities Development objectives

- VSC 07 - Promote cycling and walking within the community through the implementation of improved walking/cycling infrastructure within the Town and its hinterlands and at areas of interest and attractions.

Virginia Regeneration and Placemaking Development Objectives

- VRP 06 - Ensure that the Town centre is accessible to all members of the community, including people with mobility issues, the elderly and people with young children.

Virginia Natural and Built Heritage Development Objectives

VH 05 - Protect environmental quality in Virginia through the implementation of European, National and Regional policy and legislation relating to air quality, greenhouse gas emissions, climate change, light pollution, noise pollution and waste management.

Meath County Development Plan 2021 - 2027

The Meath County Development Plan 2021-2027 was adopted on 22nd September 2021 and came into effect on 3rd November 2021.

The Meath County Development Plan 2021-2027 includes the following specific objectives relating to the N3 Virginia Bypass:

- Section 5.3 'Policy Context' – *A number of sections of the national road network will be progressed through pre-appraisal and early planning to prioritise projects which are proceeding to construction in the National Development Plan. These projects include: … N3 Virginia Bypass, …*
- 5.8 'Developments of National and Regional Strategic Importance' – *N3 Corridor – The N3 corridor is a critical cross border economic route which is essential to facilitate strategic traffic movement and to maintain and improve connectivity to the North-West and border region. The importance of this route is recognised in both the National Development Plan 2018-2027and the NPF 2040*.
- Section 5.9 – MOV OBJ 45: *To work in conjunction with Cavan County Council in the planning and delivery of the N3 Virginia Bypass scheme located within the administrative area of Meath County Council. This project will be subject to the outcome of Appropriate Assessment process*.

2.3 Project Specific Need

This section of the report outlines and discusses the condition of the existing section of the N3 national primary road under consideration and identifies network deficiencies. These deficiencies, development policies discussed below, constitute the 'Need for the Scheme'. The following areas are assessed in terms of network deficiencies:

- Existing Road Network
- Existing Traffic conditions
- Existing Journey times
- Level of Service
- Existing Road Safety Issues
- Need for scheme – summary

2.3.1 Existing Road Network

The M3 Motorway and N3 National Primary Route form the strategic radial corridor linking Dublin with Cavan and onward to Enniskillen and beyond to Sligo and Letterkenny via Ballyshannon. The M3 motorway extends from Clonee (at the Dublin/Meath border) as far as Kells. From Kells the N3 continues in a northwest direction as a Type 2 Dual Carriageway for approximately 9.5km which terminates at an at-grade roundabout in the townland of Derver (at the Co. Meath / Co. Cavan border). See Figure 2-8 below.

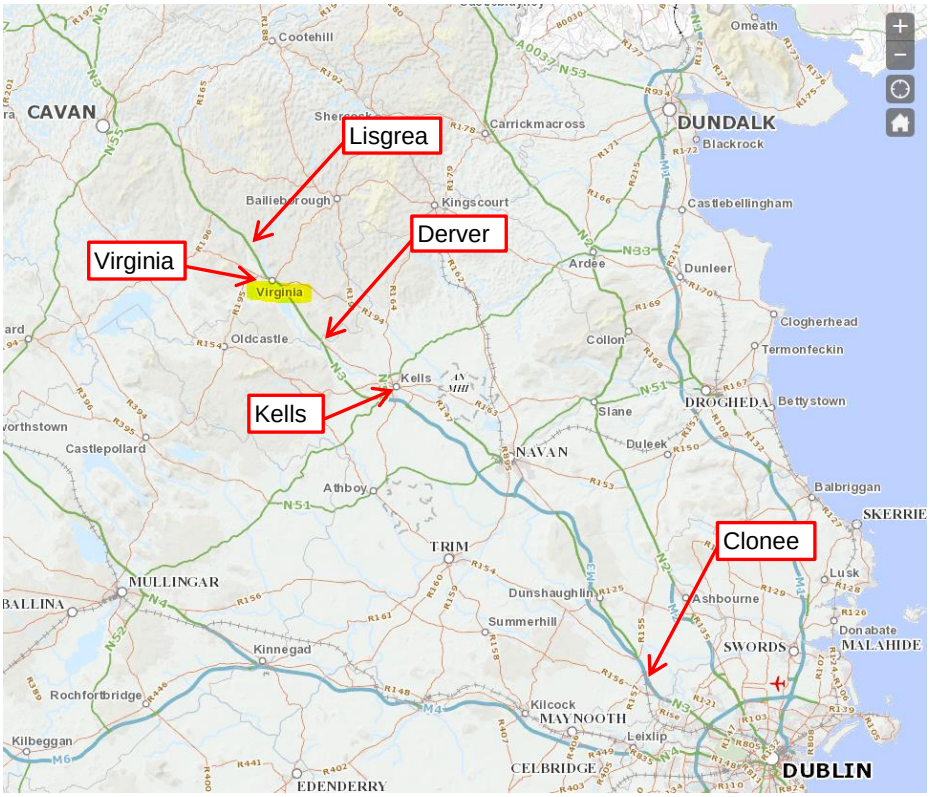


Figure 2-8 Location of Virginia along the M3/N3 Dublin to Cavan Route

North of the Derver roundabout, the N3 cross section changes to a single carriageway and for approximately 4km between Derver and Maghera the cross section is a single carriageway with hard shoulders.

Plate 2-1 - Existing N3 between Derver and Maghera (Whitegate village gateway)

Plate 2-2 - Existing N3 between Derver and Maghera

Plate 2-3 - Existing N3 between Derver and Maghera (Maghera village gateway)

Plate 2-4 - Existing N3 in Maghera

The section of N3 north of Maghera as far as the south side of Virginia, has a reduced cross section with narrow hard strips and boundary hedges and walls close to the carriageway. It also has poor horizontal and vertical alignment with severely restricted overtaking opportunities. In general, the roadsides are not considered forgiving and have no active travel facilities outside Virginia Town and the village of Maghera.

Plate 2-5 - Existing N3 between Maghera and Virginia (at HD15 site at Burrenrea, in vicinity of Glanbia Ingredients Ireland)

Plate 2-6 - Existing N3 between Maghera and Virginia (constrained cross section and roadside hazards)

Plate 2-7 - Existing N3 between Maghera and Virginia (constrained cross section and roadside hazards)

Plate 2-8 - Existing N3 between Maghera and Virginia (direct accesses)

The N3 continues through Virginia Town, where significant congestion through the town occurs especially during the AM and PM peak periods.

Plate 2-9 - Existing N3 within Virginia Town (R178 to Bailieborough traffic signals)

Plate 2-10 - Existing N3 within Virginia (town centre)

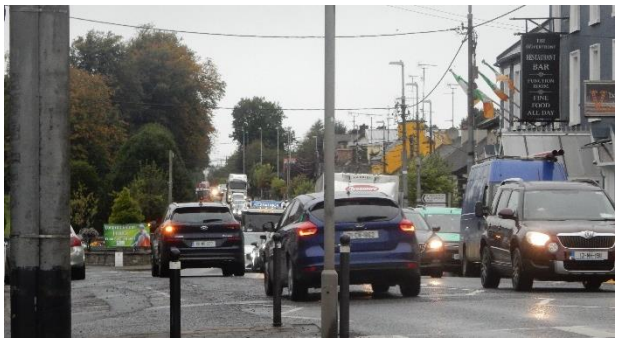


Plate 2-11 - Existing N3 within Virginia Town (R194 junction to Ballyjamesduff)

Plate 2-12 - Existing N3 within Virginia (north of town centre)

For approximately 1.5km to the north side of Virginia, the N3 remains as a narrow, undulating single carriageway without hard shoulders until Cornaslieve, where the cross-section changes again to that of a single carriageway with hard shoulders, which continues to Cavan Town and beyond.

Plate 2-13 - Existing N3 north of Virginia (HD15 site at Murmod Cross)

Plate 2-14 - Existing N3 north of Virginia (at Lisgrea Cross)

The N3 road network immediately adjacent to Virginia intersects with regional and local roads (See Table 2-1 below), which channels traffic through Virginia Town, contributing to the congestion. The R147 meets the N3 at Derver roundabout and is the old route of the N3. The R178 enters Virginia Town from Bailieborough to the northeast, and meets the N3 just to the south of the crossing of the River Blackwater. The R194 approaches the Virginia Town from Ballyjamesduff to the west, meeting the N3 adjacent to Virginia Church of Ireland. The route diverges again from the N3 at Rahardrum and heads in an easterly direction towards Mullagh and Moynalty. The R195 approaches the Virginia Town from Oldcastle to the south and meets with the R194 close to Dunancory Bridge on the southwest approach to Virginia. These regional roads are supplemented by local roads connecting communities along and across the N3.

Table 2-1 Regional and Local roads intersecting the N3

Regional Roads	Local primary Road	Local Secondary Road	Local tertiary road
R147, R194, R178 & R195	L3021, L3024, L3007 & L3012	L7112, L7125, L7106, L7102, L7101, L7127, L7031, L7032, L7033, L7027	L28245, L30241, L71012, L70414, L70312 & L70311

The speed limits between Derver at the Cavan/Meath boundary and the north side of Virginia are inconsistent which has a negative impact on traffic flow and congestion on the N3. These speed limits are described below and are demonstrated in Figure 2-9 below.

- Derver to Maghera (100 kph speed limit);
- Maghera (≈0.8km, 50 kph speed limit);
- Maghera to Virginia (≈4km, 80kph speed limit);
- Virginia Town (≈2.4km, 50 & 60kph speed limits);
- Virginia to Cornaslieve (≈1.3km, 80kph speed limit);
- N3 north of Cornaslieve (100kph speed limit).

At the time of writing this report, construction of the Virginia Street Enhancement Works is underway. The contract will involve the construction of a roundabout at the N3/R194 junction in Virginia Town, additional pedestrian crossings, upgrading and widening of footpaths and undergrounding of overhead services. These works are scheduled to be substantially complete in Q1 2023.

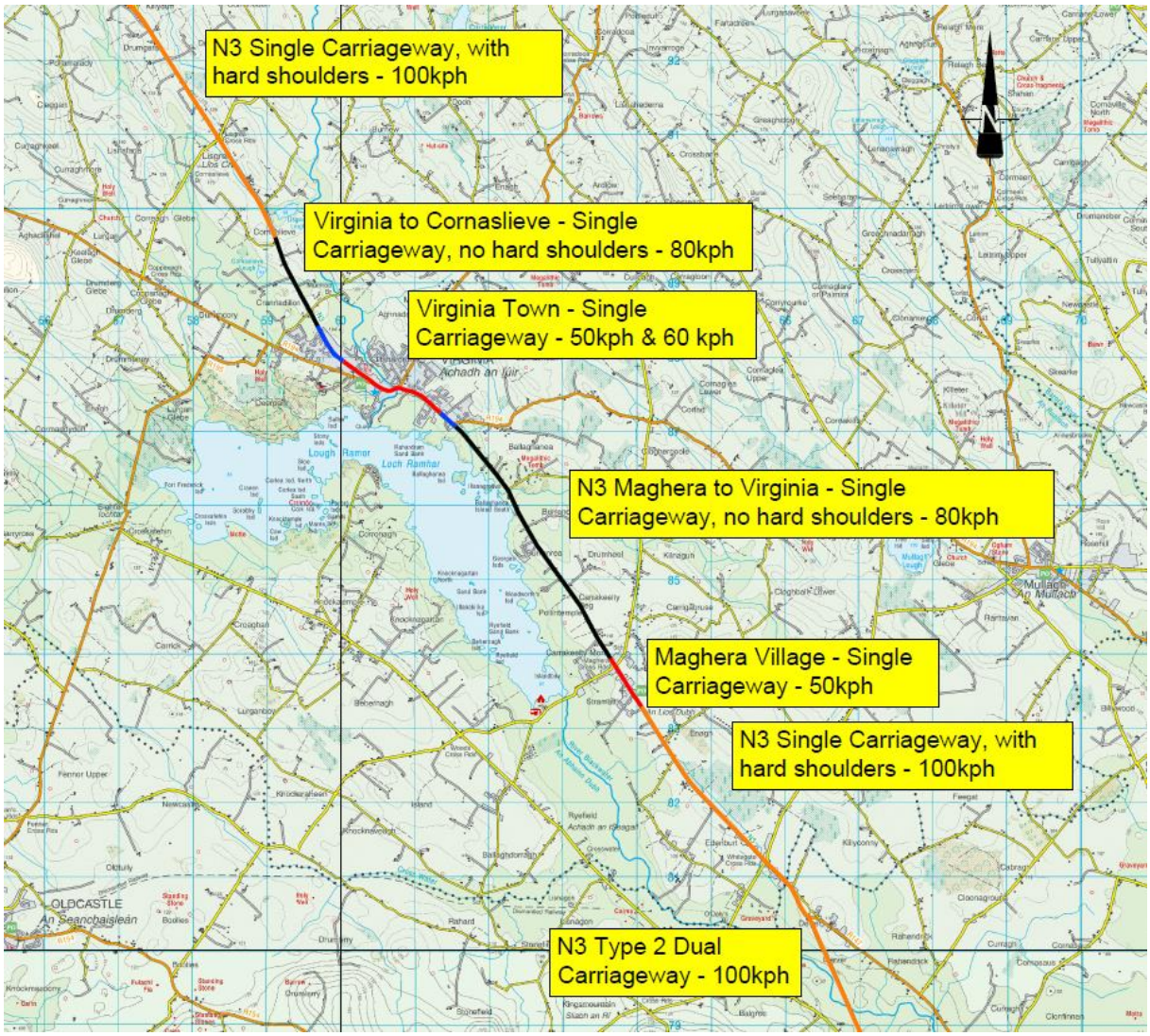


Figure 2-9 Speed limit and cross section inconsistencies

2.3.2 Existing Traffic Conditions and Levels.

The volume of traffic along the N3 between Virginia and Maghera (pre-Covid travel restriction) is in the order of 12,250 Annual Average Daily Traffic[8] with traffic volumes growing by an average of approximately 4% per annum since 2013. In addition, the TII Network Indicators 2019 demonstrates that the sections between Maghera to Virginia (4km) and Virginia to Cornaslieve (1.5km) are operating 120% above capacity, see Figure 2-10 below for extract from Transport Infrastructure Ireland National Roads Network Indicators 2019.

An analysis of CSO Census 2016 data shows that there is a significant amount of local trips (Origin & Destination in Virginia) generated within the town. These tend to be shorter distance trips which could be carried out by sustainable modes. There are also high volumes of commuting trips in the area which are destined for Dublin. Notably Cavan, Virginia and Kells contribute the most trips to Dublin along the N3 corridor.

The modal split results show that private motor vehicle is the most used mode of transport, accounting for 88% of work trips and 47% of education trips within Virginia. Public transport usage for both work and

[8] Based on Pre-Covid TII traffic counter between Virginia and Maghera in 2019.

education trips is low, but a substantial amount of children travel to school by walking (38%). This suggests that a lot of students live close to their schools.

As there is no train line within the study area below, public transport access is provided solely by buses. The majority of bus services are ones which pass through the N3 corridor on route to Dublin. Consequently, the residential areas close to the N3 have a good level of Public Transport access, with the surrounding areas having sparse, or no, coverage.

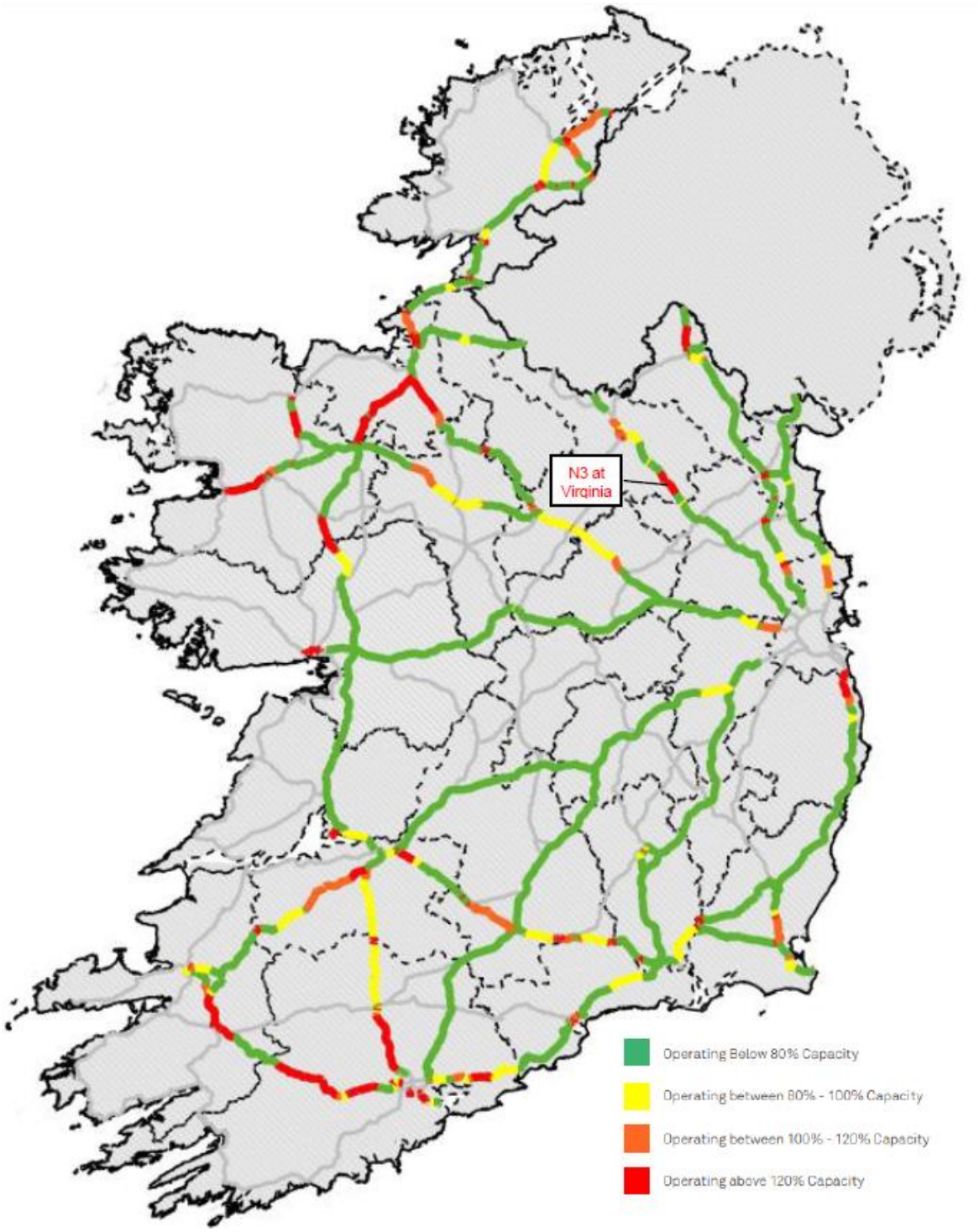


Figure 2-10 N3 National Primary Road (Volume to Capacity Ratio)

2.3.3 Existing Journey Times

Congestion is a major problem for the vehicular traffic that travel through Virginia Main Street on a daily basis. A significant volume of this traffic is commuter traffic or long-haul commercial traffic. Tailbacks into the town in excess of 3km are a daily occurrence and this adds significant journey times of between 10 to 20 minutes (and more, with up to 35 minutes anecdotally reported) in both the morning and evening peak periods above the expected journey time when driving through the town.

Plate 2-15 - Existing Traffic Queues along N3 Northbound towards Virginia Town. (≈3km from town at Burrenrea)

Plate 2-16 - Existing Traffic Queues along N3 Northbound towards Virginia Town.

In view of the existing capacity issues and the 50/60 kph and 80kph speed restricted areas, it is observed that the average journey speed is approximately 50kph over the 9km between Maghera and the north side of Virginia with no congestion within Virginia Town. The average journey speed is estimated to drop to below 25kph with congestion in Virginia Town.

2.3.4 Level of Service

The Level of Service (LOS) is a quality measure that describes the operational conditions of traffic flow. The LOS considers speed, travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience. There are six level of LOS from A to F, with LOS A representing the best operating conditions of a route, i.e. free flow conditions and LOS F the worst, i.e. breakdown of flow / congested traffic. Generally, a Level of Service (LoS) D, approaching unstable flow and equivalent to an average inter-urban journey speed of 80kph, would be regarded as a minimum acceptable standard.

The LOS "D" is a parameter set out in TII Publications (Standards) DN-GEO-03031 - June 2017, "Rural Road Link Design". The capacity in terms of Annual Average Daily Traffic (AADT) for LOS "D" for each type of road are summarised in Table 2-2.

Table 2-2 Type of Road and Capacity at a Level of Service "D"

Type of Road	Capacity (AADT) – Level of Service D
Type 3 Single Carriageway (6.0m)	5,000
Type 2 Single Carriageway (7.0m)	8,600
Type 1 Single Carriageway (7.3m)	11,600
Type 3 Dual (7.0m x 2)	14,000
Type 2 Dual (7.0m x 2)	20,000
Type 1 Dual (7.0m x 2 + 2.5m HS)	42,000

The section of N3 between Derver and north of Lisgrea comprises Type 2 / Type 3 single carriageway either side of Virginia Town and Type 1 single carriageway on sections at the northern and southern ends. The capacity for Level of Service D (AADT) for a Type 1 and Type 2 Single Carriageway is 11,600 and 8,600

vehicles respectively. The existing level of traffic along the proposed scheme is in the order of 12,250 AADT (2019 pre Covid travel restrictions). As at September 2021, the Monthly Average Daily Traffic recorded 12,175 ADT, with some Covid restrictions still in place. The combination of traffic volumes and average journey speeds demonstrates that the existing single carriageway road is currently operating at Level of Service E or below; LOS E is defined as a road having a time delay of >75%, average speeds are 72km/h and passing becomes impossible with intense platooning.

2.3.5 Existing Road Safety Issues

The sections of N3 between Virginia and Maghera (4.5km) and Virginia to Cornaslieve (1.5km) have a constrained cross section and are grossly under capacity with a significant number of direct accesses along their length.

The road has a significant number of hazards along its length, such as houses, sheds, large trees, stone and block walls, concrete and steel posts, timber and concrete rail fences, ditches and utility poles.

The junctions of virtually all the side roads and direct accesses within the existing 80km/h zone are of a poor standard, with obstructions within the visibility splays to the left and right and poor conspicuity, particularly during dark conditions. In addition, overtaking is severely restricted due to the continuous white line swapping to the opposing traffic lane over the length of these sections.

The 50 kph speed limit through Maghera (0.8km) was sought by Cavan County Council in 2009 in the interests of road safety and was approved by the National Roads Authority. A traffic calming scheme was subsequently implemented to “urbanise” this section and help reduce speeds to the 50kph limit. This has improved road safety but increased journey times.

The section of N3 through Virginia (2.7km) is a single carriageway road which runs directly through the centre of the town and carries a high volume of traffic with a significant Heavy Goods Vehicles content per day. This poses serious safety concerns for vulnerable road users. Outside the built environment of Maghera and Virginia Town, there are no provision for pedestrians or cyclists along the N3.

In addition, there is evidence of “rat runs” around rural local roads to avoid peak hour congestion in Virginia which raises further concerns about road safety on these routes.

The existing section of N3 between Maghera and Cornaslieve has a high collision rate.

Since 2014, Transport Infrastructure Ireland has identified three separate High Collision Locations along this stretch as follows:

- Site ID N03CN_076.0 Virginia Main Street
- Site ID N03CN_073.0 Burrenrea (in the vicinity of Glanbia Ingredients Ireland Ltd)
- Site ID N03CN_078.0 Murmod Cross

The Road Safety Authority (RSA) Ireland Road Collisions database has been consulted regarding collisions along the 13.6km section of the N3 between the Derver roundabout and Lisgrea Cross. An examination of the collision data shows that a total of 56 injury collisions were recorded on the route between 2012 and 2016 inclusive and a number of material damage collisions have also been recorded along this section of the N3. These can be summarised as follows:

- 4 Fatalities
- 10 Serious Injury
- 42 Minor Injury

Figure 2-11 shows the location of all personal injury collisions for the years 2005-2016 as extracted from the RSA Collisions database. Figure 2-12 shows the location of personal injury collisions involving pedestrians for the years 2005-2016 as extracted from the RSA Collisions database.

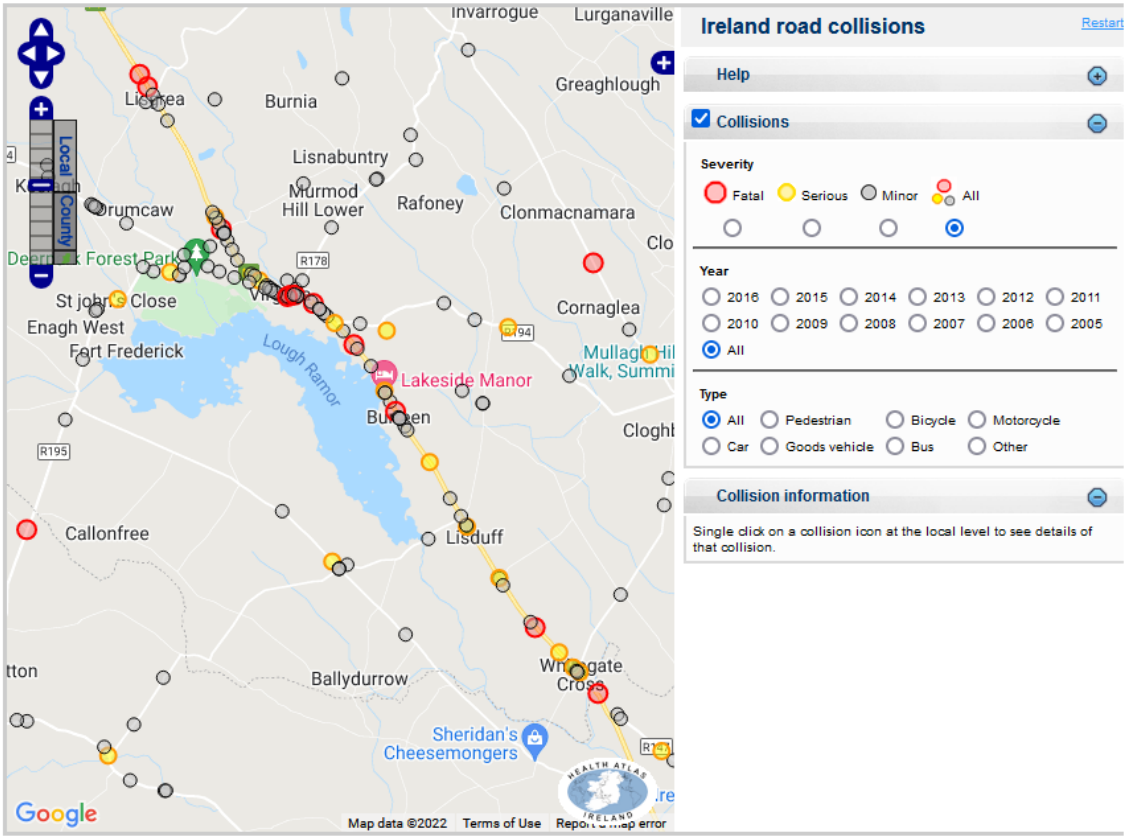


Figure 2-11 RSA Collision Data (2005 – 2016) for all years and all collision types

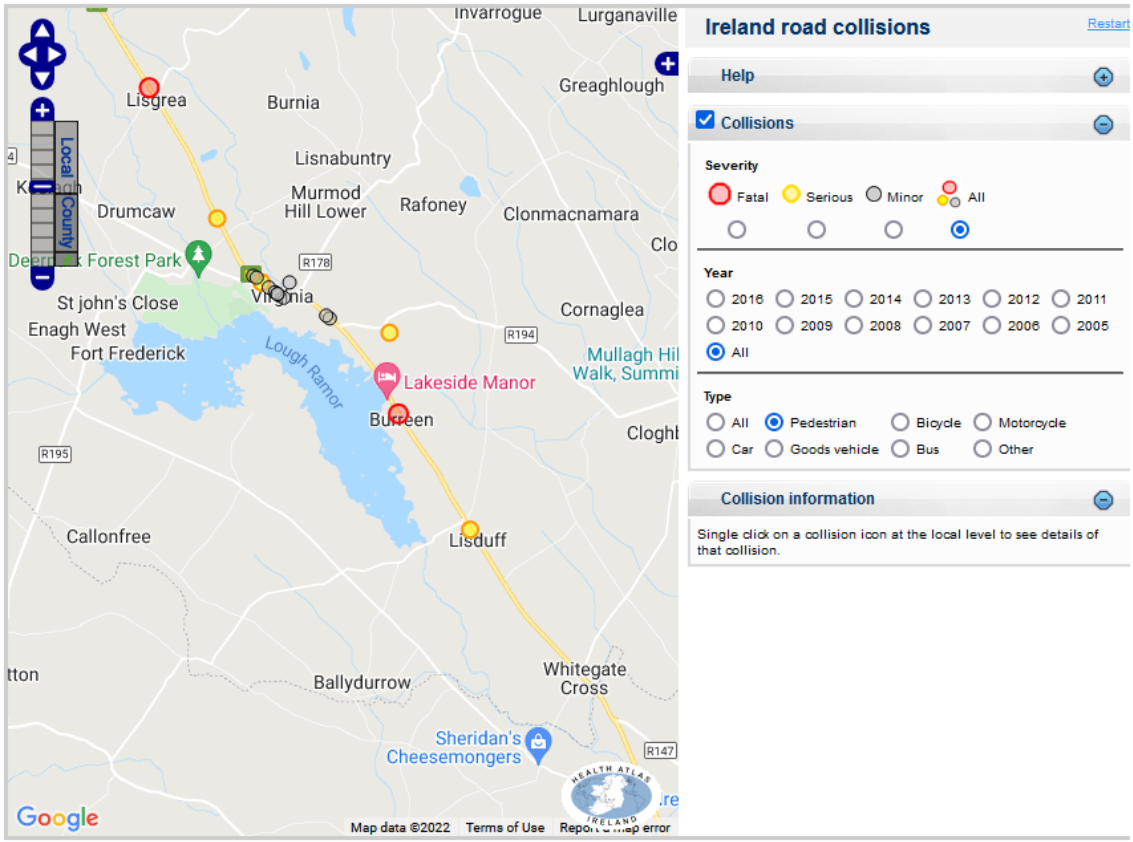


Figure 2-12 RSA Collision Data (2005 – 2016) for collisions involving pedestrians

2.3.6 Local Collision Rates

Road traffic collision information from the Road Safety Authority (RSA) has been used to calculate a local collision rate along different sections of the N3 throughout the scheme extents. The RSA collision statistics have been uplifted to account for underreporting of collision as per PAG guidance (minor collisions uplifted by a factor of 3 and serious collisions uplifted by a factor of 1.5). The Local Collision Rate has been calculated by using an average of collisions in the area over the last 5 years of available data which covers the 2012 – 2016 period. Over the course of that 5-year period, there has been 1 fatal accident in both the North and Centre locations and 2 fatal collisions in the Southern section. The total number of collisions over the 5-year period for all three sections are provided in Table 2-3 below.

Table 2-3 Average Traffic Collisions by section

ROAD	FATAL	SERIOUS	MINOR
N3 (North)	1	0	21
N3 (Centre)	1	0	18
N3 (South)	2	11	36

By working out the number of million vehicle kilometres travelled per year over the course of the below sections (using the AADT), the collision rate per million vehicle kilometres can be calculated.

Table 2-4 and Figure 2-13 below outlines the three collision rates obtained from the RSA for the different sections of the N3 and used for the Collision analysis.

Table 2-4 Local Collision Rates

ROAD	COLLISION RATE (PER 10^6 VEH.KM)
N3 (North)	0.307
N3 (Centre)	0.651
N3 (South)	0.290

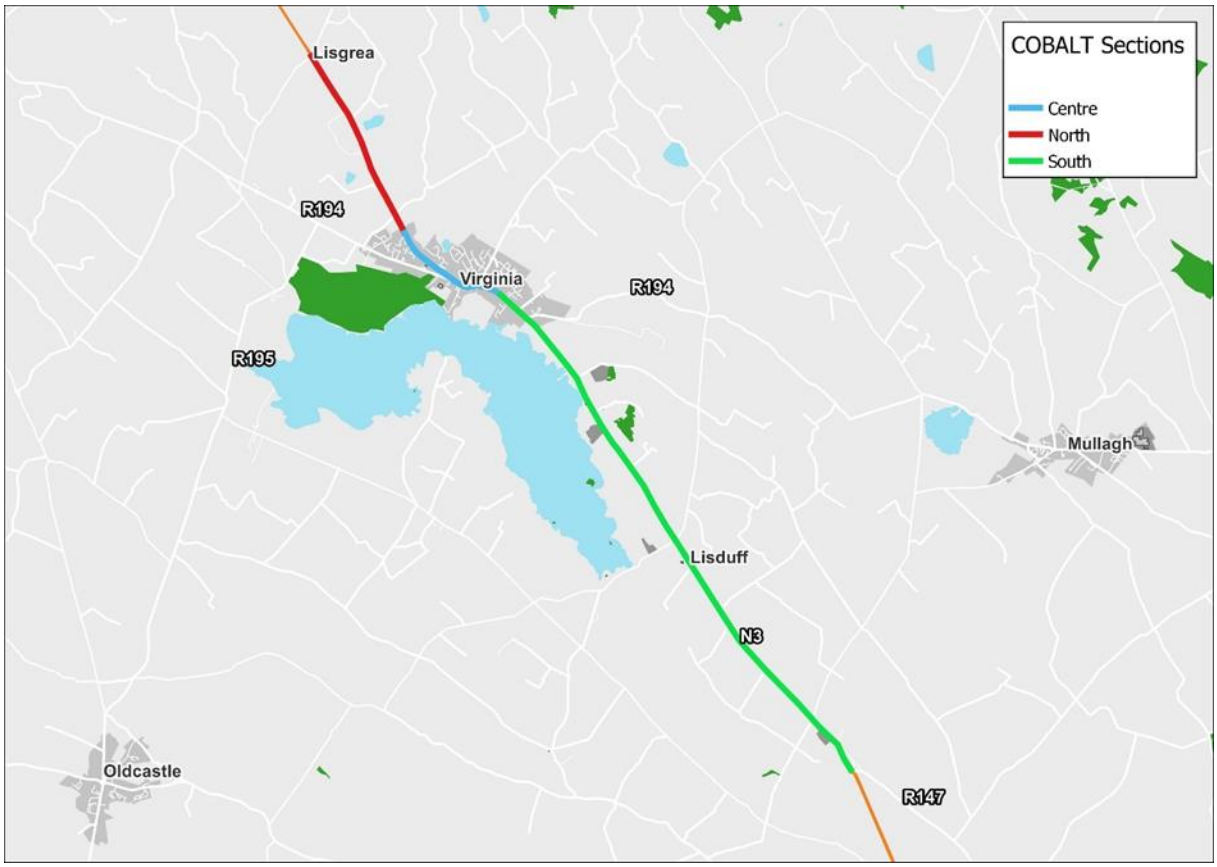


Figure 2-13 N3 Sections used in Collision Analysis

2.3.7 Network Safety Ranking

Network Safety Ranking is the process of using collision data to rank the safety of the national road network and to identify high collision locations. Collision data used for this process is collected by the Road Safety Authority. The average collision rates on the various road types (motorway, rural and urban dual carriageway, and rural and urban two-lane) are available on the website https://data.gov.ie/organization/transport-infrastructure-ireland. Based on the collision rates for 2014 to 2016, the national routes are categorised into 4 groups and represented by colour as shown in Figure 2-14.

The figure demonstrates that there is considerable variability along the N3 within the Area of Influence in terms of correlation with the national trend with results varying between the extremes of “twice below” and “twice above” national averages evident.

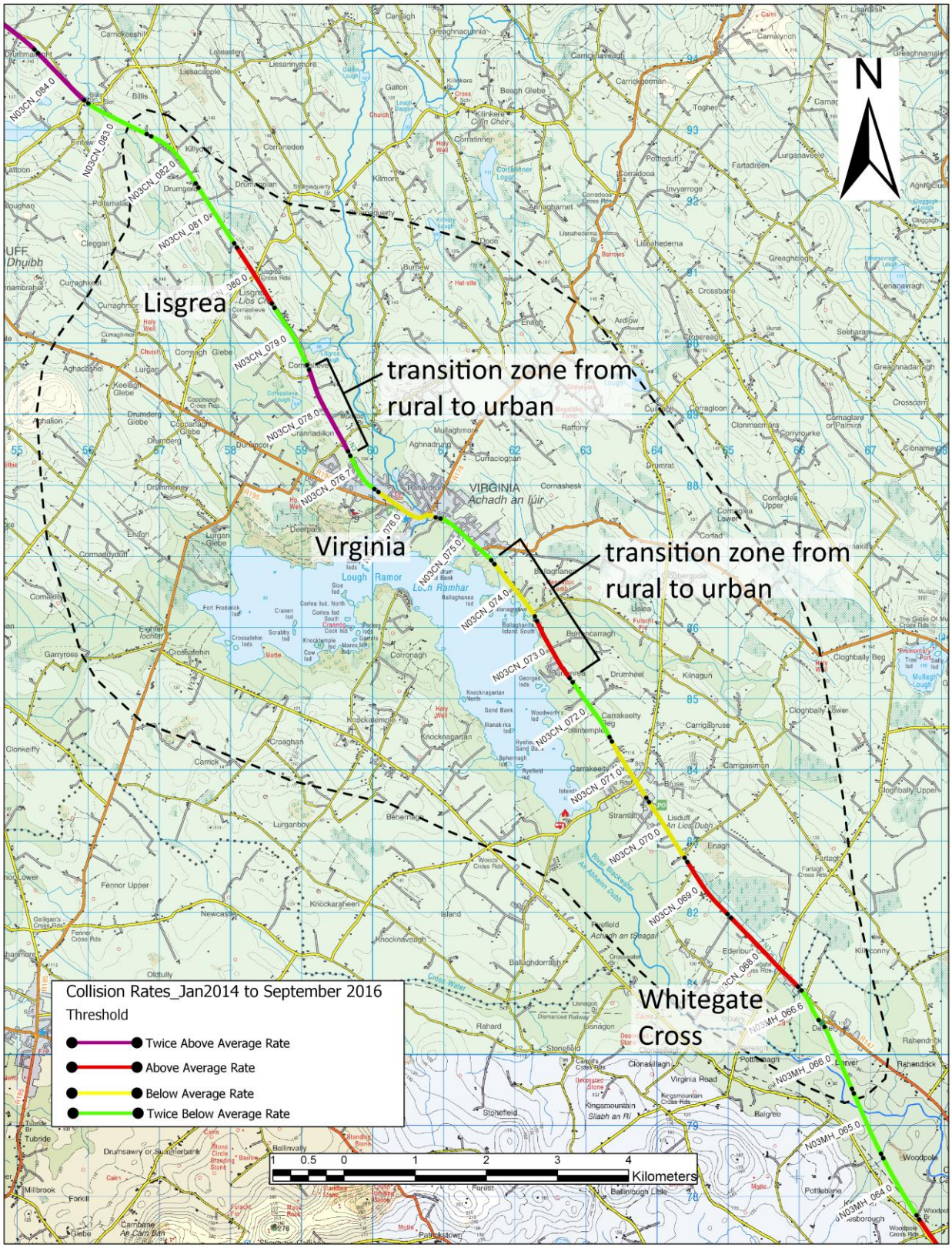


Figure 2-14 Network Safety Ranking 2014 – 2016 data

2.4 Need for Scheme - Summary

The previous sections highlight the key issues for various elements of the N3 between Derver and Lisgrea which this project hopes to address. Some of the key issues mentioned include:

- Unsuitable environment for VRUs and sustainable modes of transport;
- The conflict of strategic and non-strategic traffic through Virginia and villages, resulting in traffic congestion and unreliable journey times for users of the N3 national primary road which includes bus public transport, HGVs and other commercial vehicles, private cars, and agricultural vehicles.
- Poor collision history with Personal Injury Collision rates higher than expected based on the TII Project Appraisal Guidelines National Parameter Values;
- Varying and inconsistent cross sections along the 13.6km route between the Derver Roundabout and Lisgrea Cross, comprising 5.2km single carriageway with hard shoulder, 5.0km narrow single carriageway without hard shoulder and 3.4km of road within 50/60km/h urban / built up areas;
- Substandard alignment, forward visibility and overtaking characteristics along the route;
- Inadequate stopping sight distance arising from substandard alignment and/or reduced carriageway/verge widths;
- Varying speed limits along the route;
- Numerous substandard junctions and direct accesses to properties along the route;
- Poor journey time reliability, whereby the existing journey times along the 13.6km route between Derver and north of Lisgrea vary between 12 and 35 minutes which equates to average speeds ranging between 25km/h to 77km/h which do not meet the criteria set out in the National Planning Framework which is to “target an average inter-urban speed of 90kph”. There is a large amount of journey time variability due to congestion in Virginia and the presence of slow-moving agricultural vehicles.
- The AADT flows taken from TII TMUs 2019/2022 and also 2020 traffic counts along the N3 within the study area indicate that the N3 is currently operating well in excess of the capacity required for a Level of Service D.

This section emphasises the numerous day-to-day operational and safety issues with the N3 national road between Derver and Lisgrea which are aimed to be addressed by this project. The need for the scheme as outlined in this Chapter based on the deficiencies and characteristics of the existing road, should be combined with the national, regional and local policy discussed in Section 2.2 of the report to constitute the overall ‘Need for the Scheme’.

SECTION 3: TRAFFIC ASSESSMENT AND OPTION CROSS SECTION

3.1 Introduction

This Section describes the traffic modelling work undertaken by Systra Ltd, for the purpose of informing the selection of a Preferred Option. The full Traffic Modelling Report (TMR) is included in Volume 6 Part B. The purpose of the TMR is to describe the traffic forecasting that has been undertaken. It outlines the development of the Base Year transport model, the methodology for forecasting future year travel demands and the testing of scheme options.

An Assessment of Alternatives for the N3 Virginia Bypass scheme was carried out and the report is included in Volume 6 Part A. The objective of this Assessment of Alternatives report is to identify and consider the range of transport management and modal alternatives that may address the project objectives of the N3 Virginia Bypass scheme and to inform the selection of the most appropriate options to bring forward for further consideration. This has been done with reference to the Intervention Hierarchy outlined in the National Investment Framework for Transport in Ireland (NIFTI) which broadly dictates that sustainable mode enhancements should be prioritised where possible over road-based solutions that benefit private mode users. The Assessment of Alternatives analysis concluded that a hybrid multi-modal transport solution, which comprises potential road, bus, demand management, active travel facilities and park and share hubs (mobility hubs), is the most appropriate solution to achieve the project objectives.

3.2 Modelling Overview

The traffic model study area focusses on the town of Virginia, extending south east along the N3 to encompass the town of Kells and North west along the N3 to encompass the village of New Inn. The strategic model area also includes the towns of Ballyjamesduff to the northwest and Bailieborough to the northeast, see Figure 3-1 below.

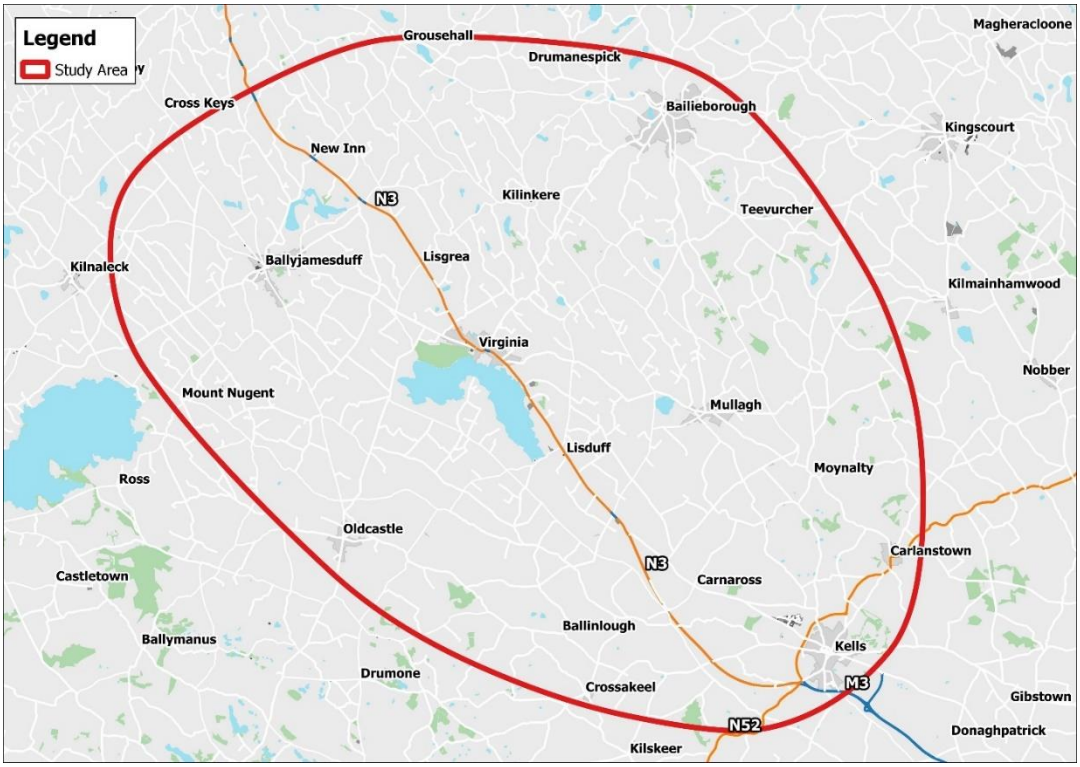


Figure 3-1 Study Area

3.2.1 Base Year Model Development

The National Transport Authority (NTA) East regional model (ERM) has been used as a starting point for the development of the single project Local Area Model (LAM) for the appraisal of scheme options, see Section 3.4.1 below. While the model focuses on Dublin, Cavan is included and exists on the periphery.

The highway element of the ERM provides the basic road network, zoning structure, trip matrices and traffic growth forecasts for the development of the LAM. Hence the Virginia LAM has been developed using SATURN strategic modelling software.

The ERM has also been used to identify the area of influence of the scheme and the associated study area for the LAM. The study area captures any potential competition with alternative routes or rerouting of traffic as a result of the proposed scheme. This study area has been cordoned from the ERM base models to form the initial LAM. The cordoned version of the LAM was then refined with additional detail added where necessary to ensure the physical characteristics of the road network are reflective of the existing network.

The zoning structure of the LAM was also refined at this stage. The ERM zonal structure is based on the CSO Electoral Divisions (ED) boundaries with each zone containing one or more EDs. These zones have been refined based on the CSO small area boundary system for consistency, to allow demographic data to be linked to each LAM zone.

Once the LAM road network and zone structure were appropriately refined the model was calibrated and validated against observed data in accordance with criteria set out in PAG Unit 5.1 (October 2016).

3.2.2 Forecast Year Models

Future growth in travel demand for the LAM has been taken from the ERM for the assessment years for this project (2028 and 2043). Annualised external (external zones of the LAM) growth rates have been calculated by cordoning the modelled study area from the future year ERM models which provide traffic forecasts through the study area. Internal (zones within the LAM) growth rates have been based on the ERM zonal growth rates between base year and future year. This internal growth was proportioned between the disaggregated LAM zones based on base year proportions or in accordance with relevant planning information (Development Plans, LAPs, etc) where appropriate. These growth rates are then applied to the calibrated base year matrices in order to create future year highway demand matrices.

3.3 Data Collection

A suite of traffic surveys was originally scheduled to take place from the middle of March 2020. However, at that time the country was in the early stages of the Covid-19 pandemic and a national lock down was introduced which resulted in restrictions being placed on the movement of people in order to contain the virus. Traffic surveys undertaken during this period of restriction would therefore be of little use in terms of model development given the a-typical nature of the travel patterns. At the time, TII issued guidance recommending that all project teams postpone any planned traffic surveys during this period of changed travel behaviour. As a result of the national lock down the March 2020 traffic surveys were postponed.

By September 2020, a number of the movement restrictions had been eased and the traffic surveys were carried out In September and October 2020. In summary, the traffic surveys included the following:

- Automatic Traffic Count (ATC) data at 26 locations covering two consecutive weeks;
- Junction Turning Count (JTC) data at 33 locations;
- Journey Time Surveys along 3 routes in the study area; and
- Origin Destination Surveys at 26 locations.

Full details of the traffic surveys collected including the locations are contained in the Traffic Modelling Report included in Volume 6 Part B.

3.4 Traffic Modelling

This section summarises the development of the base year Virginia Local Area Model (VLAM) with reference to the following aspects and provides an overview of model calibration and validation.

- Modelling software used;
- Model time periods; and
- Network development.

Full details of development of the traffic model, and model calibration and validation are contained in the Traffic Modelling Report included in Volume 6 Part B.

3.4.1 East Regional Model (ERM) Overview

At the time of modelling, the decision was made to use the National Transport Authority's Eastern Regional Model (ERM) to inform traffic growth in the study area rather than using TII's National Transport Model (NTpM). This decision was based on the following combination of reasons:

- The ERM is a strategic multi-modal transport model representing travel by all the primary surface modes – including, walking and cycling (active modes), and travel by bus, rail, tram, car, light goods and heavy goods vehicles;
- The Cavan County Development Plan 2022 – 2028 wasn't available at the time to inform the distribution of new traffic growth in the study area;
- The ERM's zoning system is more disaggregated in our study area compared with TII's National Transport Model (NTpM);
- The NTA's planning team develop land use forecasts by Census Small Area which is the smallest geographical boundary available and these forecasts inform the level of traffic growth in each model zone. As such, it was the best source of data we had at the time to inform the distribution of traffic growth around Virginia; and
- The NTA traffic growth forecasts were also more conservative than the equivalent TII forecasts. As such, they were deemed suitable to use at the comparative assessment stage.

The ERM is a strategic multi-modal transport model representing travel by all the primary surface modes – including, walking and cycling (active modes), and travel by car, bus, rail, tram, light goods and heavy goods vehicles, and broadly covers the eastern side of the country with a focus on Dublin; Cavan is included in the model and exists on the periphery.

The ERM sits within the overall NTA Regional Modelling System which comprises of the following three main components, namely:

- The National Demand Forecasting Model (NDFM);
- 5 Regional Models (including the ERM); and
- A suite of Appraisal Modules.

The NDFM takes input land-use attributes such as population, no. of employees etc., and estimates the total quantity of daily travel demand produced by, and attracted to, each of the 18,488 Census Small Areas in Ireland.

The ERM is comprised of the following key elements:

- **Trip End Integration:** The Trip End Integration module converts the 24 hour trip ends output by the NDFM into the appropriate zone system and time period disaggregation for use in the Full Demand Model (FDM);
- **The Full Demand Model (FDM):** The FDM processes travel demand, carries out mode and destination choice, and outputs origin-destination travel matrices to the assignment models. The FDM and

assignment models run iteratively until an equilibrium between travel demand and the cost of travel is achieved; and

- **Assignment Models:** The Road, Public Transport, and Active Modes assignment models receive the trip matrices produced by the FDM and assign them in their respective transport networks to determine route choice and the generalised cost for each origin and destination pair.

Destination and mode choice parameters within the ERM have been calibrated using two main sources: Census 2016 Place of Work, School or College - Census of Anonymised Records (2016 POWSCAR), and the Irish National Household Travel Survey (2016 NHTS). Therefore, the ERM is the ideal tool to cordon the LAM from, and to estimate the multi-modal impact of transport schemes within the study area. In addition, it provides the platform to forecast the future trip demand and distribution to/from the area.

3.4.2 Model Software Platform: SATURN

The model software used to develop the Virginia LAM is the SATURN (Simulation Assignment of Traffic to Urban Road Networks) suite of transportation modelling programs.

The standard model time period for traffic simulation and assignment models is one hour and therefore model development and data collection was carried out based on this assumption.

Through a review of survey data, it was noted that the highest traffic flows entering and leaving the area were experienced from 08:00 to 09:00 in the AM, 17:00 to 18:00 in the PM and the average hour between 10:00 to 16:00 for the IP period. Therefore, the LAM was developed, calibrated and validated to represent the following time periods:

- AM Morning peak period: 08:00 to 09:00
- PM Evening peak period: 17:00 to 18:00
- Average Inter peak period: 10:00 to 16:00

The trip demand matrices for these time periods, representing a base year of 2020, were developed for the LAM using extractions from the ERM combined with survey data. The demand matrices are segregated into two vehicle types (or user classes), as follows:

- User Class One - Cars and light Goods Vehicles (LV's). All cars and two axle trucks or other type commercial vehicles are considered LV's; and
- User Class Two - Heavy Goods Vehicles (HV's). This user class is comprised of goods vehicles with 3 or more axles.

3.4.3 Network Development

The goal in developing the LAM was to create a model that accurately reflects current traffic conditions in the traffic model study area (illustrated in Figure 3-1 previously) for the 2020 base year, and to a sufficient level of detail to allow the appraisal of each option. To achieve this goal, the model must be defined in terms of road network and trip demand representation.

The ERM was utilised as a donor model for generating the initial highway network for the LAM. Additional network and junction detail was then added to Local Area Model Network.

Figure 3-2 below illustrates the newly developed road network for the LAM. To ensure full network coverage and route choice, most roads in the study area have been considered, from the national primary routes to more minor regional and local roads. The short dead-end links in the figure below are "spigots" used to load traffic from the zones onto the network, and reflect the further developed zone network that is outlined in Figure 3-3 below.

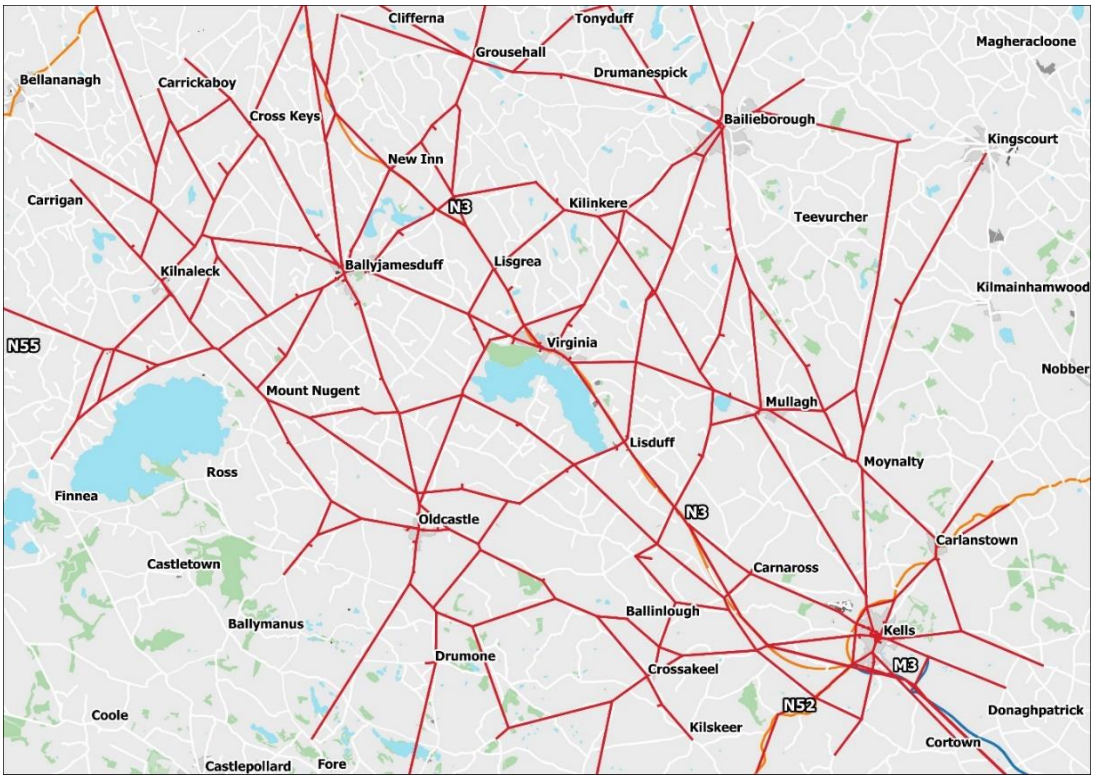


Figure 3-2: LAM Highway Network

3.4.4 Model Zone System and Prior Matrix Development

As outlined previously, the ERM was used as a basis for development of the LAM road network. However, as the study area is located outside of the main model area, the ERM zone structure was subject to additional subdivision in order to allow it to accurately reflect traffic loading along the N3.

To provide an accurate representation of traffic loading onto and near the existing N3, a detailed zonal structure was developed for the LAM to reflect key generators and attractors of trips such as:

- Shopping centres / retail car parks / supermarket car parks;
- Key employment locations;
- Townlands; and
- Housing Estates – areas that load onto the network in one specific place.

Figure 3-3 illustrates the zonal system developed for the study area. In total, 105 zones have been created, with 70 internal zones within the study area and 35 external zones representing the roads that enter the area of interest. This level of detail ensures that traffic loads accurately onto both sides of the N3 and the surrounding road network.

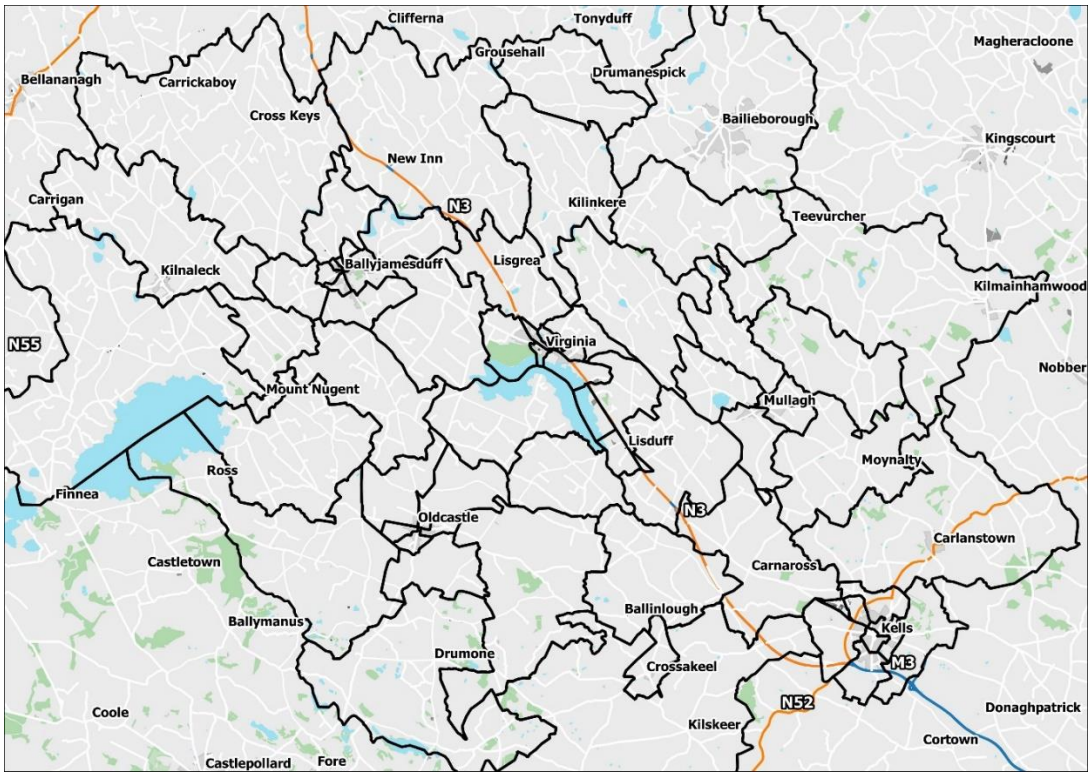


Figure 3-3: Disaggregated N3 Zone System

As noted above, the Full Demand Model carries out mode and trip destination choice for all zones within the ERM. The FDM has been calibrated using Census data, and hence, provides a robust and accurate representation of trip distributions across the model network. In order to generate prior matrices for the study area, a cordon was extracted from a 2019 run of the ERM. The cordon function within SATURN, facilitates the extraction of trip matrices for a subset area of the ERM whilst still maintaining route and destination choice from the full model.

3.4.5 Assignment Method

The standard Wardrop Equilibrium using the Frank-Wolfe algorithm has been adopted as the assignment procedures for the highway model, to be consistent with the Eastern Regional Model and other regional models.

Tight highway assignment convergence is important in order to provide a robust appraisal. A highway assignment convergence with a %GAP<0.02% was achieved in the LAM, which considerably exceeds WebTAG guidance (%GAP<0.1%).

3.4.6 Generalised Cost Parameters

The SATURN assignment procedure builds paths through the network based on the generalised cost formulation. Generalised cost is a linear combination of time and distance, using values of pence per minute (PPM) and pence per kilometre (PPK) to convert distance into generalised minutes. It takes the following form:

Generalised Cost (minutes) = time + distance*PPK/PPM

The values of PPM and PPK within the LAM are based on the guidance on parameter values issued by the Department for Transport (DoT) and set out in the Common Appraisal Framework (CAF) (March 2016, updated October 2021).

Full details of model calibration and validations are contained in the Traffic Modelling Report included in Volume 6 Part B.

In summary:

- The NTAs ERM was used as a basis for development of the Virginia Local Area Model with additional network and zonal detail added to more accurately represent localised traffic movements;
- The model has been calibrated and validated in-line with TII Project Appraisal Guidelines and meets all specified criteria for all modelled time periods
- The LAM is fit for purpose, and represents base year traffic conditions well, as demonstrated statistically through calibration and validation.
- While the traffic surveys were undertaken during a period where the country was under Covid-19 travel restrictions, the LAM still provides a robust basis for assessing the proposed route alignment options as:

  – The model realistically represents journey times;
  – The study area is covered by a large number of calibration counts;
  – Trip length distributions have not been significantly altered during the Matrix Estimation processes.

3.4.7 Summary

This section documents the development of the Virginia Local Area Traffic Model (in accordance with TII Project Appraisal Guidance) and its application to assist in the Phase 2 Option Selection process for the N3 Virginia Bypass.

The LAM has been developed, calibrated and validated to reflect the observed base year (2020) traffic conditions for the following time periods:

- AM Morning peak hour: 08:00 to 09:00
- PM Evening peak hour: 17:00 to 18:00
- Average hour during Inter peak: 10:00 to 16:00

The model has been calibrated and validated in-line with TII Project Appraisal Guidelines and conforms to all link calibration criteria specified in PAG Unit 5.1 for each period modelled. The LAM is therefore considered fit for purpose and provides a robust basis for assessing the proposed route options.

3.5 Future Year Model Development

This section summarises the development of the future year ERM & Virginia LAM models for the scheme opening year (2028) and design year (2043). These forecast years will be used for assessing the performance of the Scheme and for input into the design process. Full details of the future model development are contained in the Traffic Modelling Report included in Volume 6 Part B.

3.5.1 Future Year Network Development

The future year networks include the different alignment options to be tested. The future year networks developed are:

- 2028 Opening Year; and
- 2043 Design Year.

Do-Minimum Networks

The Do-minimum scenario is a reference case against which each of the options will be assessed. In general, the Do-Minimum Scenario consists of the existing road network plus any planned or committed schemes for the area.

Included as part of the Do Minimum scenario for this modelling assessment are the following Traffic Management proposals which are planned for the Town of Virginia. These measures aim to make the town safer and more attractive for vulnerable road users:

- Recently implemented 80 Kph speed limits between Maghera and Virginia and on the north side of Virginia to Cornaslieve;
- Reconfigured signal timings in the town to facilitate longer pedestrian / cyclist crossing times, to be completed prior to the end of the street enhancement works which are currently under construction; and
- Upgrading the Main Street and change of the R194 Ballyjamesduff Road junction to a roundabout junction, currently under construction:
  - Including modelling a 30 kph speed limit along the N3 through Virginia Town to simulate slower traffic speeds as a result of the four additional zebra crossings and new roundabout on the N3, currently under construction.

Do-Something Networks

The same proposals included in the Do Minimum scenario have also been brought forward into the Do Something scenarios. These were modelled in conjunction with each of the Do-Something Options to be assessed. Five main options and five other variations between options were assessed. These are outlined in Table 3-1 and shown in Figure 3-4 and Figure 3-5 below.

Table 3-1 Stage 2 Options and Option Variations

Option Name	Corridor Option Description
Option A (Green)	This option was originally envisaged as an online upgrade option. During the Stage 1 and early Stage 2 assessment process, it became evident that such an upgrade of the existing road would not meet the objectives of the scheme. The option was then amended so that it would encompass an online upgrade for a distance of approximately 3km, south of Maghera. From there it veers to the northwest to join the Option C alignment at Carrigabruise. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Aghnadrung. It follows the Option C alignment for a distance of approximately 8.5km, veering to the north west to meet the existing N3 at Cornaslieve north of Virginia. From Cornaslieve the option would consist of an online upgrade, passing through Lisgrea Cross before terminating approximately 400-500m to the north of the crossroads. It crosses the Blackwater River once, north of Virginia. Link roads from the existing N3 to the option at Burrencarragh and from the R194 Ballyjamesduff Road to the option at Cornaslieve were also investigated for this option.
Option B (Purple)	This option is approximately 18.5km in length and commences at the N3/R147 roundabout at Derver. It is the only option that passes to the west of Virginia Town and Lough Ramor. From Derver the option goes in a south-westerly direction, crossing the Blackwater River SAC / SPA and veering to the north west after approximately 2km. The option crosses the Cross Water River and passes through Munterconnaught. It crosses the R195 Oldcastle Road at Eighter, before veering to the north east and crossing the R194 Ballyjamesduff Road at Lurgan. It crosses the Dunancory River before meeting the existing N3 north of Lisgrea Cross.
Option C (Red)	This option is approximately 14.7km in length and commences at the N3/R147 roundabout at Derver. It passes to the east of Virginia Town and Lough Ramor. From Derver the road follows roughly parallel to the existing N3, before veering slightly more to the north at Carrigabruise townland. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Aghnadrung. It crosses the Blackwater River three times north of Virginia before meeting the existing N3 north of Lisgrea Cross. Approximately 60% of the option is common to the route of the N3 Virginia Bypass which achieved Part 8 planning approval in 2003. Link roads from the existing N3 to the option at Burrencarragh and from the R194 Ballyjamesduff Road to the option at Cornaslieve were also investigated for this option.
Option C variant 1 (Cv1)	This option is approximately 14.9km in length and commences at the N3/R147 roundabout at Derver. It follows the Option C alignment for a distance of approximately 5.5km, veering to the north to join Option D at Cornashesk, near where that option crosses the R194 Mullagh Road. From here the alignment follows Option D, crossing the R178 Bailieborough Road at

Option Name	Corridor Option Description
	Curracloghan. The option crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross. A link road from the existing N3 to the option at Burrencarragh was also investigated for this option.
Option C variant 2 (Cv2)	This option is approximately 14.6km in length and commences at the N3/R147 roundabout at Derver. It follows the Option C alignment for a distance of approximately 11.5km, veering to the north west to cross the existing N3 at Cornaslieve north of Virginia. From Cornaslieve the option runs almost parallel to, and west of, the existing N3 before veering to the north east to meet the existing N3 north of Lisgrea Cross. It crosses the Blackwater River once, north of Virginia. Link roads from the existing N3 to the option at Burrencarragh and from the R194 Ballyjamesduff Road to the option at Cornaslieve were also investigated for this option.
Option D (Orange)	This option is approximately 15.2km in length and commences at the N3/R147 roundabout at Derver. It passes to the east of Virginia Town and Lough Ramor. From Derver the road passes first in a northerly, then north westerly direction, roughly parallel to the existing N3. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Curracloghan. The option crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option D variant 1 (Dv1)	This option is approximately 15.4km in length and commences at the N3/R147 roundabout at Derver. It follows the Option D alignment for a distance of approximately 2km, before veering to the north east to join Option E. It follows this option for a distance of approximately 4km, before rejoining Option D. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Curracloghan. It crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option E (Pink)	This option is approximately 15.5km in length and commences at the N3/R147 roundabout at Derver. It passes to the east of Virginia Town and Lough Ramor. From Derver the road passes in an approximately northerly direction, then veering north westerly, roughly parallel to the existing N3. The option crosses the R194 Mullagh Road at Corfad and the R178 Bailieborough Road at Cornashesk. It crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option E variant 1 (Ev1)	This option is approximately 15.3km in length and commences at the N3/R147 roundabout at Derver. It follows the Option E alignment for a distance of approximately 2km, before veering to join Option D. It follows this option for a distance of approximately 4km, before rejoining Option E. The option crosses the R194 Mullagh Road at Corfad and the R178 Bailieborough Road at Cornashesk. It crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option E variant 2 (Ev2)	This option is approximately 15.7km in length and commences at the N3/R147 roundabout at Derver. It follows the Option E alignment for a distance of approximately 8.5km, before veering west to join Option D. It follows this option for the remainder of its length. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Curracloghan. The option crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.

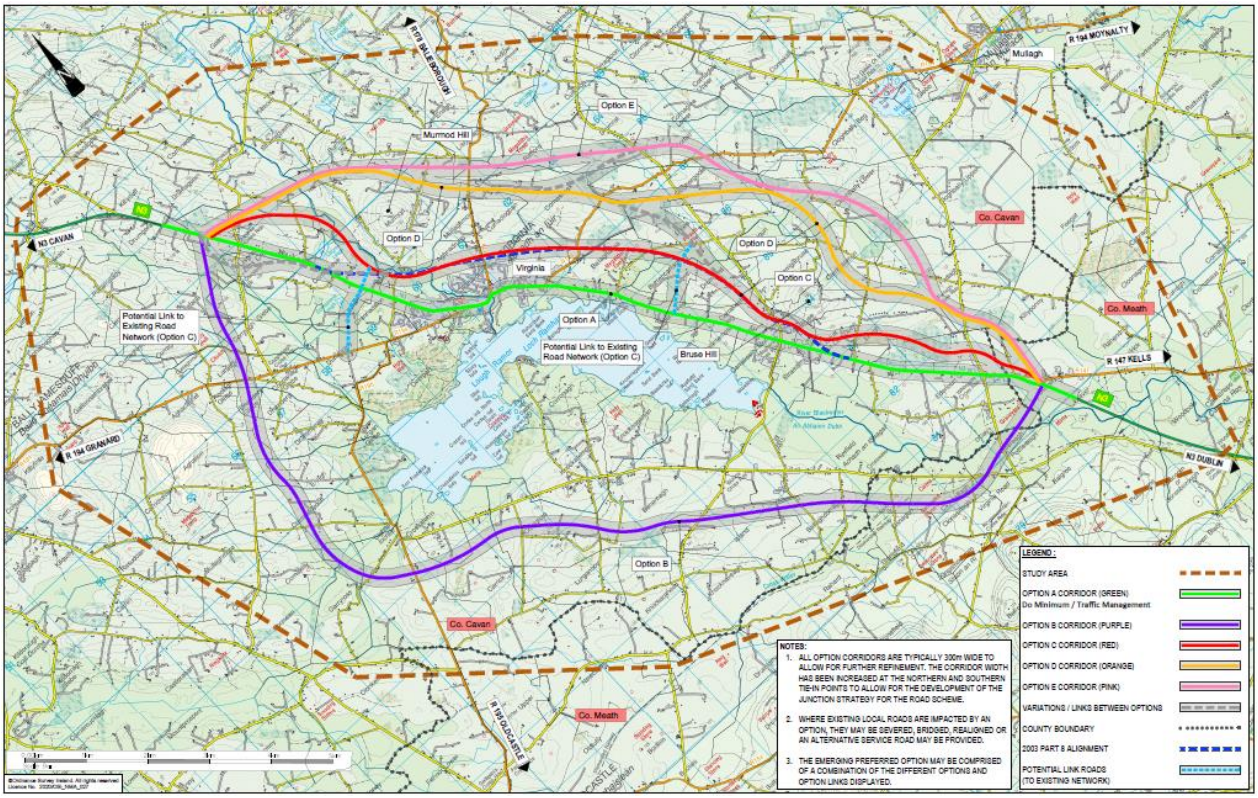


Figure 3-4 Stage 2 Option Corridors

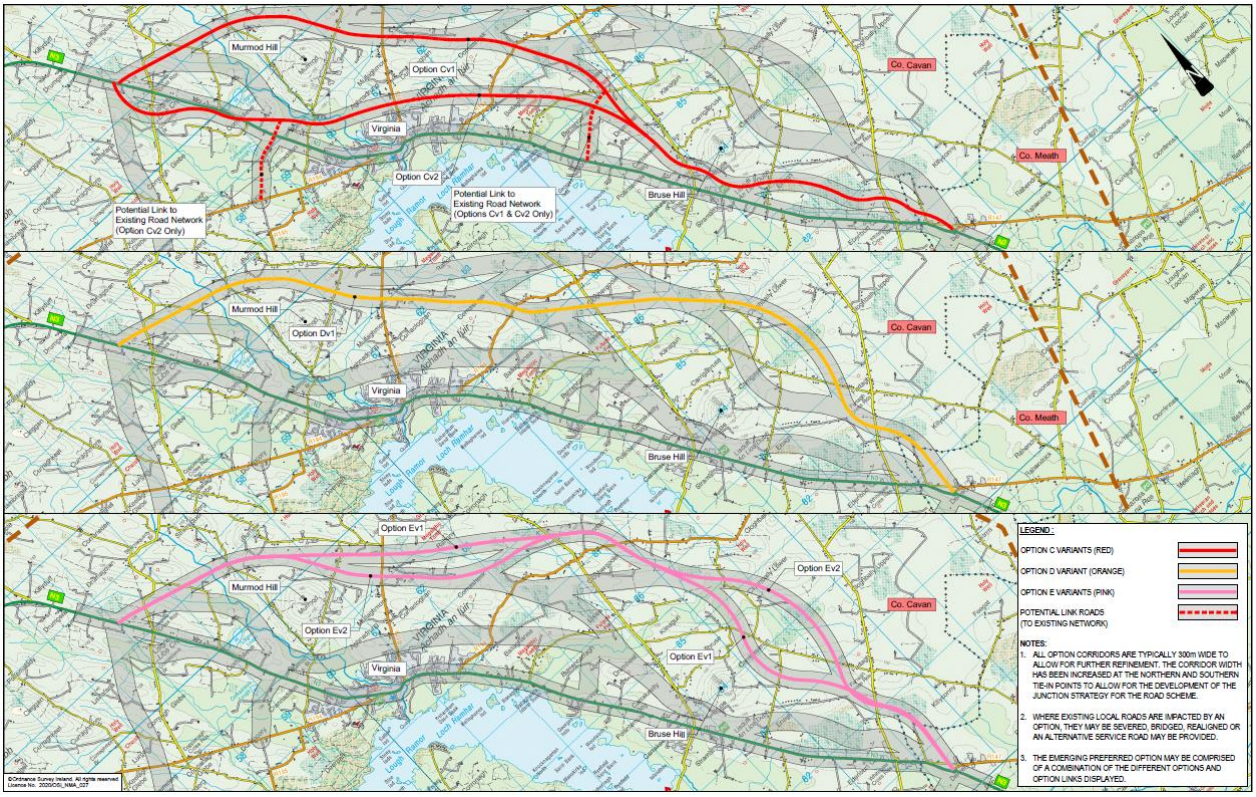


Figure 3-5 Stage 2 Option Variants

3.5.2 Future Year Travel Demand Estimation

The ERM Future year travel demand is based on forecasts of population, employment and education data as defined by the National Transport Authority at the Census Small Area (CSA) level. The National Demand Forecasting Model converts this forecast planning data to trip forecasts (in total productions and attractions

per zone) for input to the Eastern Regional Model. The travel demand for the assessment years for this project (2028, 2043) have been derived by linear interpolation of the NTA's, 2043, NPF Scenario.

Annualised external growth rates have been calculated by cordoning the modelled study area from the future year (2043) ERM model. Internal growth rates have been based on the ERM zonal growth rates. This internal growth was proportioned between the disaggregated LAM zones based on base year proportions or in accordance with the county development plan and information from the planning department of Cavan County Council, where appropriate.

3.5.3 Goods Vehicle Growth

For the NTA's Regional Models, and therefore the Virginia LAM, Goods vehicle growth is assumed to increase broadly in line with economic growth forecasts. CSO Gross Domestic Product (GDP) forecasts have been used to derive a growth factor for HGV traffic for each of the Future Years Assessed.

3.5.4 Vehicle Operating Costs

Vehicle Operating Costs (VOCs) were assumed to remain constant in real terms through time, as recommended in the TII PAG.

3.5.5 Future Year Matrix Totals

A comparison of the peak hour trip matrix totals for the Base Year, 2028 Opening Year and 2043 Design Year scenarios are outlined in the tables below, in terms of PCU's (passenger car units).

Table 3-2 Matrix Totals 2028 Opening Year

Time Period	Unit	2020	2028
AM	PCUs	7,913	9,179
IP	PCUs	5,619	6,420
PM	PCUs	8,565	9,745

Table 3-3 Matrix Totals 2043 Design Year

Time Period	Unit	2020	2043
AM	PCUs	7,913	10,299
IP	PCUs	5,619	7,356
PM	PCUs	8,565	10,938

3.5.6 Future Year Matrix Analysis

The TII PAG require a quantitative assessment of the impact of the traffic forecasting process to be undertaken to ensure that the process of applying traffic growth factors does not unduly distort the trip matrix. These checks include assessing the following criteria:

- Trip Length Distribution;
- Trip End Growth; and
- Zone to Zone Growth.

Further details for each of these criterion are provided in the Traffic Modelling Report included in Volume 6 Part B.

3.6 Traffic Assessment of Corridor Options

The Traffic Modelling Report provides detailed traffic assessment of corridor options. The performance of each option was assessed, based on the following analysis:

- Network Performance Indicators
- Journey Times
- Reduction of Traffic on Main Street in Virginia
- AADT Flows

3.6.1 Network Performance Indicators

The following network statistics are presented for each scenario:

- **Transient Queues:** represents time spent in queues at junctions which are not over capacity, for example, at a signalised junction where the queue is able to clear during a single cycle. This is presented in total pcu.hours which is essentially the volume of vehicles on the network multiplied by the time spent in transient queues.
- **Over-capacity Queues:** occur where the volume of turning movements exceed junction capacity, such that a permanent queue builds – for example at a signalised junction where a queue is unable to clear in a single cycle. Similar to transient queues, over-capacity queues are presented in total pcu.hours
- **Total Travel Time:** represents the total travel time for all vehicles on the network in the modelled period measured in pcu.hours.
- **Total Travel Distance:** represents the total distance travelled by vehicles on the road network in the modelled period measured in pcu.kms
- **Average Speed:** represents the average speed of all vehicles travelling on the network within the modelled time period measured in kph.

The Network Performance Stats indicate that all options reduce the total travel time throughout the study area relative to the Do-Minimum scenario and provide a similar average speed. In the AM, all five main options achieve a similar average speed increase (3 – 4 kph increase) and a similar total travel time reduction (5 – 6% decrease). For the interpeak, all five main options achieve a similar average speed increase (3 – 4 kph increase) and a similar total travel time reduction (4 – 6% decrease). In the PM, they all achieve a similar average speed increase (5 – 6 kph increase) and a similar total travel time reduction (6 – 7% decrease).

3.6.2 Journey Times

A journey time analysis has been undertaken for all options through and around Virginia. The routes assessed are shown in Figure 3-6 below. The green and magenta routes were assessed to consider rat running to avoid congestion along the N3 through Virginia.

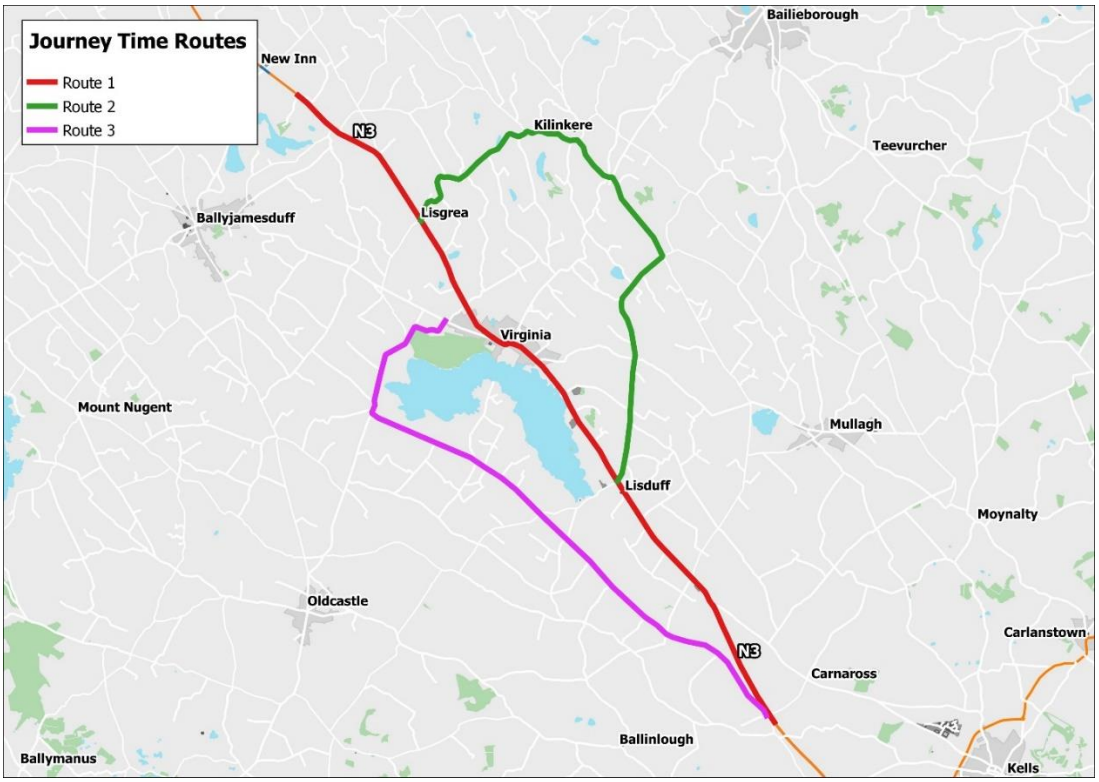


Figure 3-6 Journey Time Routes

The journey time analysis shows that options A, C, D and E produce similar end to end journey times and thus similar savings compared to the DM (37% - 38% saving in the southbound direction in the AM which is a saving of approx. 10 minutes and 45% - 46% saving in northbound direction in the PM which is a saving of approx. 13 minutes). Meanwhile, Option B results in a 30% reduction in the southbound journey time in the AM which is the equivalent of approx. 8 minutes and a 39% reduction in the northbound journey time in the PM which is the equivalent of approx. 11 minutes. This is to be expected given that Option B is the longest option and thus vehicles have further to travel.

3.6.3 Reduction of Traffic on Main Street in Virginia

Virginia experiences considerable congestion within its Town Centre. Successive county plans have noted the need for a bypass which would help alleviate this congestion and provide an improved environment and more accessibility for vulnerable road users within Virginia. Therefore, an analysis has been undertaken to check the reduction in traffic through Virginia Town following the inclusion of each option.

The results show that Options A and C are the best performing options in terms of removing the most traffic from Virginia Town across all time periods with a 74% reduction in the AM, a 79% reduction in the inter peak and 72% reduction in the PM. Options B, D and E all produce very similar results (50 – 52% in the AM, 49 – 54% in the inter peak and 45 – 50% in the PM.

3.6.4 AADT Flows

In terms of AADT and transference of traffic from the existing N3, Options A and C show the highest forecast AADTs with approximately 11,500 vehicles using the new road between the Burrencarragh Link Road and the R178 Bailieborough Road and approximately 14,050 between the Ballyjamesduff Link Road and the R178 Bailieborough Road. Option B has the next highest transference with approx. 10,600 vehicles, while Options D and E both produce similar results with approx. 9,000 vehicles.

Table 3-4 2043 AADT Values

Option	Northern Section	R178-BJD LR*	Middle Section	Bur. LR to R178†	Southern Section
Option A	8391			11448	13399
Option B	8796		10600		9171
Option C	8378	14051	-	11529	10029
Option D	9344		9054		7423
Option E	9115		8222		7233
Modified Option CV2 ¥	8468	14082	-	11363	9863

** BDJ LR = Ballyjamesduff Link Road*

† Bur LR = Burrencarragh Link Road

¥ From Table 8-11 of TMR for Modified Option CV2, Comparative assessment modelling based on a do-minimum scenario that includes a planned 30 kph speed limit within Virginia Town centre. Refer to the Preferred Option Alternative Scenario without the planned 30 kph do-minimum speed limit as described in Section 5.5.

3.7 Initial Selection of Road Type

In order to assess and compare the Do Something options, design parameters were established so that alignment designs for each option could be developed. The alignment designs developed for the Option Selection process are not the finalised design and are subject to further changes as the project develops and further assessments and information become available. In addition, as the project develops option designs may extend beyond the option corridor. However, the initial alignment designs are required to feed into the comparative assessment of options, including the economic assessment: for example, determining and comparing the costs of the options, future traffic flow capacities etc.

As the N3 Virginia Bypass will form part of the National Primary Road network, a design speed of 100km/h has been selected as appropriate for this phase.

The traffic flows on the existing N3 through Virginia are forecast to be approximately 13,500 AADT with 15% HGVs for the scheme Design Year 2043. Options A, B, C, D and E are forecast to carry up to approximately 14,050 AADT, 10,600 AADT, 14,050 AADT, 9,300 AADT and 9,100 AADT respectively in the Design Year 2043. Table 3-5 below is a summary of the road capacity to achieve a Level of Service "D" for various road cross sections as extracted from Table 6.1 of TII Publication (Standards) DN-GEO-03031 Rural Link Road Design (June 2017).

Table 3-5 Type of Road and Capacity at a Level of Service "D"

Type of Road	Capacity (AADT) – Level of Service D
Type 3 Single Carriageway (6.0m)	5,000
Type 2 Single Carriageway (7.0m)	8,600
Type 1 Single Carriageway (7.3m)	11,600
Type 3 Dual (7.0m +3.5m [2+1 retrofit])	14,000
Type 2 Dual (7.0m x 2)	20,000

With an expected AADT of close or greater than 11,600 AADT and less than 20,000 AADT for the forecast year 2043 and to achieve a minimum Level of Service D – "approaching unstable flow", requires the cross-section of the proposed road to be a Type 2 Dual Carriageway.

It is noted that the appropriate cross section is required to be selected with reference to the TII Project Appraisal Guidelines. To accommodate the predicted traffic volumes and ensure route consistency, a Type 2 dual carriageway is proposed at this option selection phase. If the northern section of the scheme has projected traffic flows significantly less than 11,600 AADT, then a Type 2 Dual Carriageway may not be warranted. However, the preliminary model was carried out at a time with some Covid restrictions were in place and it was estimated that a 12% reduction in traffic flows at the time of the Sept / Oct 2020 survey when compared to pre-Covid traffic. N3 traffic (as at end April 2022) is running at about 98% of pre-Covid traffic so it is likely the preliminary base model is on the low side for traffic estimates. Nonetheless; a detailed model will be carried out in Phase 3 with updated traffic surveys undertaken in October 2022.

At Phase 3, a comparative assessment will be undertaken to compare a single and dual carriageway cross section over all or part of the proposed scheme. This comparison will consider the economic, safety, environmental, accessibility and social inclusion, integration and physical activity criteria for the different cross sections.

The Type 2 dual carriageway cross section is depicted in Figure 3-7 below. For the option selection stage, a shared two-way pedestrian/cycle facility is proposed within the verge of the Type 2 dual carriageway.

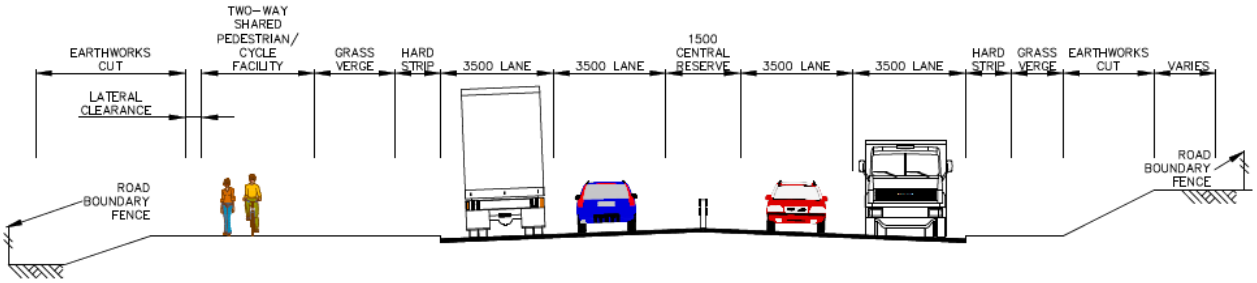


Figure 3-7 Type 2 Dual Carriageway Cross Section

3.8 Consideration of Indicative Junction Design Approach

As part of the option selection, it was necessary to determine requirements for junctions providing access on and off the new road Scheme. An initial junction strategy has been carried out with analysis at this stage being of a preliminary nature with further detailed analysis to be undertaken on the Preferred Option at Phase 3.

Any proposed road bypass option will be a National Primary Road and will be a protected road. Direct accesses onto a protected road should be avoided unless no other feasible alternative access is available. Therefore, for option selection, it was assumed that access would only be provided at the tie in points of the scheme and at the envisaged key junction locations along the scheme, generally at regional road crossings.

At this Phase 2, the terminal junctions at either end of the scheme are envisaged to be at-grade roundabouts; with the proposed bypass tying into the existing roundabout at Derver at the end of the existing Kells Type 2 Dual Carriageway bypass. At Phase 3 and when the detailed traffic model is developed, the capacity of the existing at-grade Derver roundabout will be assessed and if the capacity of the at-grade junction exceeds the desirable minimum, then a grade separated junction will be investigated.

For other junctions proposed at regional road or link road crossings, they have been established as compact grade separated junctions in order to minimise journey time delay on the strategic network. At Phase 3 and when the detailed traffic model is developed, the capacity of all junctions will be assessed in detail and the junction strategy confirmed.

All crossings with local roads are envisaged to be bridged or diverted. Access to private lands and houses off the proposed mainline carriageways will be avoided by diverting either the house access or access tracks onto the local road network. By limiting the number of accesses onto the new proposed mainline carriageway the overall safety of the road will be improved.

SECTION 4: CONSTRAINTS STUDY

4.1 Introduction

The first key activities of the Option Selection Process are the definition of the Study Area and the identification of existing constraints within the Study Area. The existing constraints are to be documented and mapped as part of Constraints Study such that the options/alternatives under consideration, as per Section 5 (Consideration of Alternatives and Options) of this Report, can be assessed and developed taking cognisance of such constraints, and where feasible and practical, avoid these constraints.

A detailed description of the Study Area and the identification of the existing constraints is outlined in the Constraints Study Report, which is provided in Volume 3, along with the associated Constraints Drawings which are provided in Part B of Volume 2 (Drawings). The Study Area for the project comprises a sufficiently large area to encompass feasible options to meet the requirements for the project, and to ensure that environmental constraints in the wider area can be adequately considered. The Zone of Influence (ZoI) for various disciplines may vary and there may be scientifically appropriate reasons for extending this ZoI further afield, depending on the pathway of potential impacts.

The Study Area for the N3 Virginia Bypass scheme is illustrated in Figure 4-1 below. The study area is located mainly in south County Cavan and to an extent in north County Meath. The Study Area surrounds Virginia Town and Lough Ramor extending west towards Ballyjamesduff and east towards Mullagh village. The Study Area crosses into County Meath to the west of Carnaross village and to the east of Oldcastle town. Virginia is the only urban area within the Study Area.

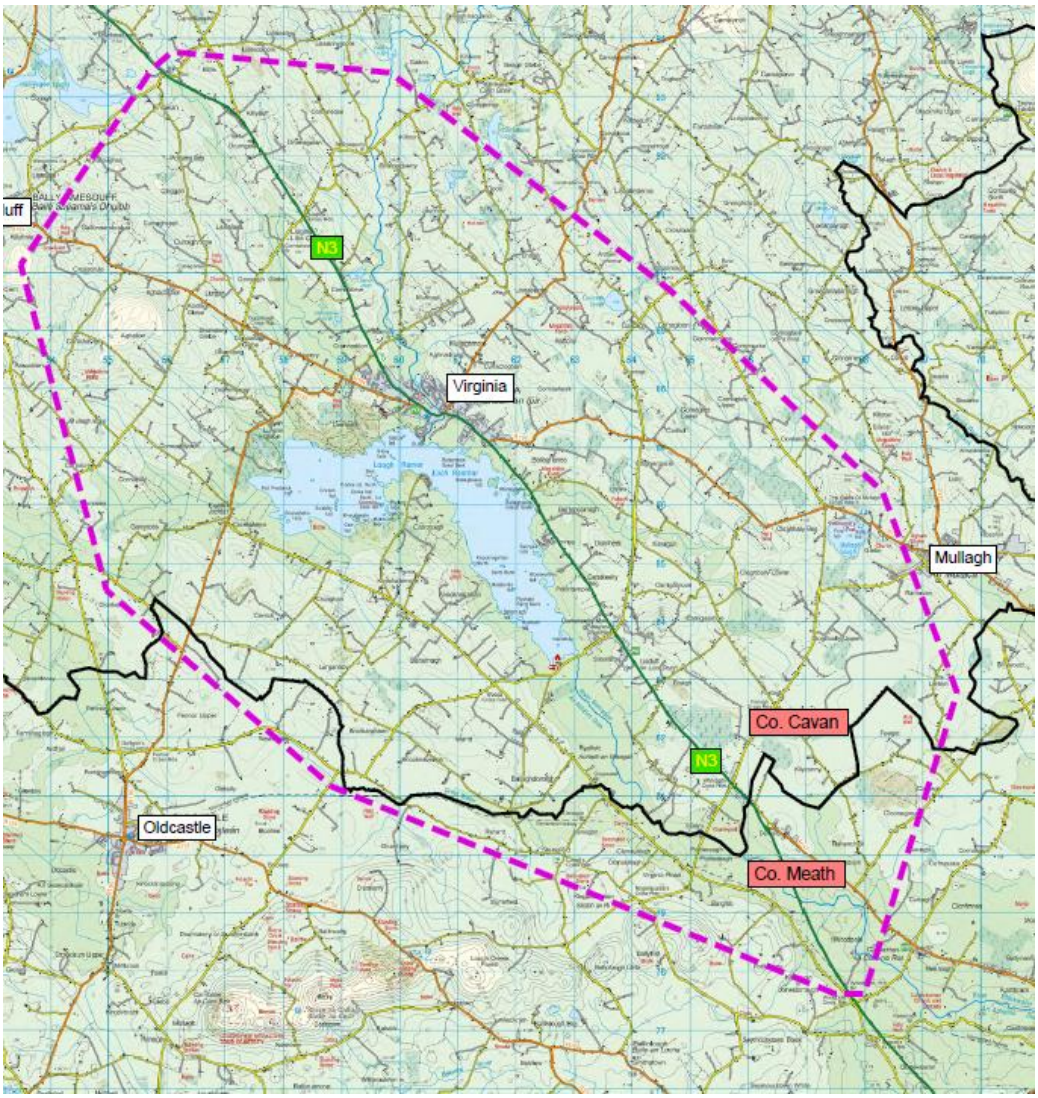


Figure 4-1 Study Area

4.2 Natural and Physical Constraints & External Parameters

The scope of the constraints study is to identify and map the nature and extent of potential anthropogenic and environmental constraints that exist within the identified Study Area of the project. The purpose of completing this exercise is to identify where such constraints may impact upon the development of the proposed roads and in so doing will inform both the stakeholder consultation and Phase 2 Option Selection process. The constraints study has been compiled with reference to the TII planning guidelines[9], the TII PMG (2019) and the environmental factors provided in Article 3 of the Environmental Impact Assessment Directive 2011/92/EU as amended by Directive 2014/52/EU[10], as transposed into Irish legislation by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018, S.I. No. 296 of 2018. Article 3 states:

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

[9] NRA (2008) Environmental Impact Assessment of National Road Schemes – a Practical Guide.

[10] Hereafter referred to as the 'EIA Directive'.

(a) population and human health;
(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
(c) land, soil, water, air and climate;
(d) material assets, cultural heritage and the landscape;
(e) *the interaction between the factors referred to in points (a) to (d).”*

In accordance with the TII Project Manager's Manual for Major National Road Projects 2019 (PE-PMG-02042), the constraints study also considered the natural constraints (landscapes and features), physical constraints (the built environment) as well as the external parameters (design standards, policy, legal issues). The natural and physical constraints were assessed in terms of the environmental factors as per Appendix A2.2 of TII Project Management Guidelines. External parameters were considered in terms of alignment with design standards, achieving the objectives of EU, national and local policies, and meeting legal requirements, e.g. protecting the integrity of Special Area of Conservation (SAC) and Special Protection Area (SPA) designated sites.

The constraints study presents the constraints in line with the above environmental factors (EIA Directive and TII PMG) in the following order. The section references are to Volume 3 Constraints Study of Option Selection Report.

- Population and Human Health (**Section 5**);
- Biodiversity (**Section 6**);
- Land, Geology and Soils (**Section 7**);
- Hydrogeology (**Section 8**);
- Water (**Section 9**);
- Air and Climate (**Section 10**);
- Noise and Vibration (**Section 11**)
- Material Assets – Non-Agricultural (**Section 12**);
- Material Assets – Agriculture (**Section 13**);
- Cultural Heritage including archaeology, architecture and culture (**Section 14**);
- Landscape and Visual Impact Assessment (**Section 15**); and
- External Constraints not included above (**Section 16**).

A summary of key constraints and parameters listed above is provided in Table 4-1. Further information on all constraints is contained in Volume 3 (Constraints Study Report). The table below includes key reference documents informing the constraints study while all reference legislation and guidance documents are included in the full report in Volume 3.

Table 4-1 Constraints Identified in the Study Area

Category	Source	Constraints
Legislative, Planning and Policy	• EU and National Legislation • National, Regional and Local Planning Policy	• Compliance with the Water Framework Directive, Habitats Directive, Birds Directive and fishery related legislation will create constraints on the proposed measures to varying degrees depending on the final proposed route. • National and regional policies aim to contribute to mitigating the effects of floods and are also required to enhance the protection for the aquatic environment through complying with the requirements of the Habitats Directive and Birds Directive. • Archaeological and Cultural Heritage legislation pertaining to protected structures may constrain proposed structural works at river crossings.

Category	Source	Constraints
Population and Human Health	• Geodirectory 2019. • Census 2016 (CSO). • Cavan County Development Plan, Various County and Local Level strategies and Local Area Plans.	• Commercial, business and residential properties present a constraint. Socio-economic constraints in the region, such as the population, employment and health provisions, will for the most part, not be adversely affected by the project. Overall, the project aims to improve conditions within the town by reducing traffic congestion and improving the safety conditions of the road.
Biodiversity	• National Parks and Wildlife Service, National Biodiversity Data Centre (including National Bat Database) and Botanical Society of Britain and Ireland databases. • Environmental Protection Agency online Map Viewer database (Envision). • Irish Wetlands database managed by Wetland Surveys of Ireland. • BirdWatch Ireland Database. • 1:50,000 Discovery Series Maps (Ordnance Survey Ireland) and Aerial images. • Bat Conservation Ireland Database. • Review of existing literature on fisheries.	• The Study Area includes River Boyne and River Blackwater SPA, River Boyne and River Blackwater SAC, Killyconny Bog SAC, Lough Ramor pNHA, and Killyconny Bog pNHA. • The special conservation interest for the SPA is Kingfisher (*Alcedo athis*). The qualifying interests for the River Boyne and River Blackwater SAC are: Alkaline fens; Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae); River Lamprey (*Lampetra fluviatilis*); Salmon (*Salmo salar*); and Otter (*Lutra lutra*). The qualifying interest for the Killyconny Bog SAC are Active Raised Bog (a Priority habitat under Annex II) and Degraded Raised Bog. • 56 sites of ecological interest identified within the Study Area. • Records for two rare plants, Heath or Wood Cudweed (*Omalotheca sylvatica,syn. Gnaphalium sylvaticum*) and Shepherds needle (*Scandix pectin-veneris*), and one rare bryophyte (moss), River Bristle-moss (*Orthotrichum rivulare*), identified within the Study Area. • Records of protected faunal species including mammals and birds identified within the Study Area. • There are a number of known bat roosts in the vicinity of Virginia Town and records of following bat species are identified within the Study Area: Soprano pipistrelle (*Pipistrellus pygmaeus*); Common pipistrelle (*Pipistrellus pipistrellus*); Unidentified pipistrelle (*Pipistrellus spp*.); Nathusius's pipistrelle (*Pipistrellus nathusii*); Daubenton's bat (Myotis daubentonii); Leisler's bat (*Nyctalus leisleri*); Natterer's bat (*Myotis nattereri*); Brown long-eared bat (*Plecotus auritus*); and Myotis sp. • White-clawed crayfish (*Austropotamobius pallipes*), listed under Annex II of the EU Habitats Directive, is likely to occur on all watercourses given the suitability of the water chemistry. • A number of lakes and rivers occur within the Study Area, Lough Ramor and River Blackwater being the main feature. • The Blackwater and other watercourses are likely to support populations of European Eel (*Anguilla anguilla*) along with Brook Lamprey (*Lampetra planerii*), Stone Loach (*Barbatula barbatula*), Three-spined Stickleback (*Gasterosteus aculeatus*), Minnow (*Phoxinus phoxinus*) and a variety of introduced coarse fish species. Lough Ramor is a popular lake with anglers and is well known for its Pike (*Esox lucius*) and coarse fishing, occasional Salmon, Brown Trout,

Category	Source	Constraints
		stocks of large Pike and many 20lbs fish which are frequently recorded.
Land, Geology and Soils	• Geological Survey of Ireland (GSI) database. • 1:100,000 scale Geological Map Series Sheet No. 13 'Geology of Meath' and its accompanying memoir.	• The presence of NPWS protected sites, soft ground, potential karst features, three Geological Heritage sites, a nearby landfill (north of Ballyjamesduff that is within 2 km of the Study Area boundary) and areas of high risk landslide vulnerability (southeast of Ballyjamesduff and north of Mullagh Lough) present constraints within the Study Area.
Hydrogeology	• Geological Survey of Ireland (GSI) database. • Environmental Protection Agency database. • Local Authorities Water Services database. • 1:50,000 Discovery Series Maps (Ordnance Survey Ireland).	• The presence of karst features, Locally Important aquifer, areas of high and extreme groundwater vulnerability, groundwater wells and springs, and hydrogeological impacts associated with Groundwater Dependent Terrestrial Ecosystems (e.g. fens, turloughs, bogs) present constraints within the Study Area.
Water	• Vector Maps, Six-inch Maps and Discovery Series Maps (Ordnance Survey Ireland). • Aerial Images. • The Office of Public Works website. • River Basin Management Plan for Ireland (2018-2021). • Water Framework Directive (WFD) national website and Water Maps viewer. • Environmental Protection Agency database.	• There is a potential for proposed options to cross the River Blackwater and consequently the River Boyne and River Blackwater SAC and SPA. The River Blackwater currently has "Moderate to Good" status as per River Waterbody WFD Status 2013-2018 and is at the risk of not achieving "Good" status. Avoidance and prevention of deterioration of water quality status as a result of any works being carried out during the project is of importance. This would apply particularly where any works are being carried out over or adjacent to watercourses and waterbodies which could potentially result in silt. • Several recurring flooding events have been recorded within the Study Area in the past.
Air Quality and Climate	• Environmental Protection Agency (EPA) Air Quality Data. • EPA IPPC applications and licences. • National Parks and Wildlife Services database. • Cavan County Council Planning website.	• The most sensitive receptors within the Study Area include residential properties, five schools, nine churches, seven sports centres, one shopping area and ecologically protected areas considered to be important on a European as well as Irish level.
Noise & Vibration	• Environmental Protection Agency (EPA) Noise Mapping database. • EPA IPPC applications and licences.	• The most sensitive receptors within the Study Area include residential properties, five schools, nine churches, seven sports centres, one shopping area and ecologically protected areas considered to be important on a European as well as Irish level.
Material Assets (Non-Agricultural)	• Environmental Protection Agency database • 1:50,000 Discovery Series Maps (Ordnance Survey Ireland). • Data from utility service providers.	• The primary constraints within the Study Area are the utilities and existing transport infrastructure. Early consideration of how options can integrate with the existing material assets in the area is essential and will require engagement with service providers to ensure that utilities can be avoided and/ or modified to mitigate

Category	Source	Constraints
		impacts. A gas Transmission Main is located within the Study Area to the east side of Lough Ramor.
Material Assets (Agricultural)	• 1:50,000 Discovery Series Maps (Ordnance Survey Ireland) and Aerial images. • Environmental Protection Agency IPC licencing database. • Consultation with local agricultural advisors. • Property Registration Authority of Ireland (PRAI) database. • Cavan County Council Planning website. • Irish National Soils Map, 1:250,000k, V1b (2014). • Soil Associations of Ireland and their Land Use Potential (1980). • General Soil Map of Ireland (1980). • Agricultural statistics from Central Statistics Office and Department of Agriculture. • Other published sources and survey reports.	• The agricultural constraints within the Study Area include farmhouses and farmyards where the essential farm buildings and facilities are located for the operation of on-farm activities. The on-farm facilities include buildings for animal housing, fodder storage, milking parlour/dairy, machinery storage, general purpose buildings, etc. and other farm facilities for slurry storage, fodder storage, animal handling (pens, yards, sand areas, equine walkers, gallops), horticultural glasshouses / polytunnels, etc. • There are also agricultural farming enterprises considered to be of a sensitive nature or of importance in terms of type or scale including dairy farms, equine farms involved in sport horse and show jumping industry, pig farms, poultry farms and horticulture enterprises. • Commercial businesses associated with the agricultural sector were also identified within the Study Area, outside the environs of Virginia Town.
Cultural Heritage	• Archaeological Survey of Ireland's Sites and Monuments Record (SMR) and the Record of Monuments and Places (RMP) for County Cavan and County Meath. • The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) for Counties Cavan and Meath. • National Museum of Ireland (NMI) Topographical Files. • Historical publications and cartographic sources. • Placenames Database of Ireland. • Documentary sources.	• 43 No. cultural heritage constraints that retain multiple survey and/or designation reference identification are recorded within the Study Area. • 217 No. recorded archaeological site RMP/SMR records located within the Study Area. • 84 No. sites listed on the Record of Protected Structures and a total of 67 No. sites listed on the National Inventory of Architectural Heritage are located within the Study Area.
Landscape & Visual Impact	• Cavan County Development Plan 2014 – 2020. • Meath County Development Plan 2013 – 2019	Cavan County Development Plan 2014 – 2020 • The Study Area is located within Landscape Character Area 3 (Lake Catchments of South-East Cavan) and Area 5 (Highlands of East Cavan). • Special consideration and protection given to certain landscape types and amenity features, those within the Study Area are: ML4 Lough Ramor located on the western side of Virginia Town; L15 Virginia Town,

Category	Source	Constraints
		Lough Ramor; L16 Old Quay, Corronagh, Lough Ramor; and L17 Mullagh Lough, Mullagh. • A County Heritage Site which helps define the historical landscape character is recorded within the Study Area, Mullagh Lake. • The Development Plan list those public rights of way which are afforded special protection, three of these are recorded within the Study Area. Meath County Development Plan 2013 – 2019 • The Study Area is located within Landscape Character Area 20 (River Corridor and Estuary Type).
External Parameters		• TII technical standards. • Procedural, financial and legal requirements.

Figure 4-2 below shows the combined constraints within the N3 Virginia Bypass Study Area.

4.3 Recent Constraints

In October 2021, it was noted that the OPW had updated their website to include indicative flooding areas outside of the CFRAMs areas. The indicative flooding areas included on the OPW flood maps website are shown to be over larger areas than what anecdotal flooding information had been acquired to date. At Phase 3, detailed investigations of flooding and flood modelling will be undertaken for the Preferred Option.

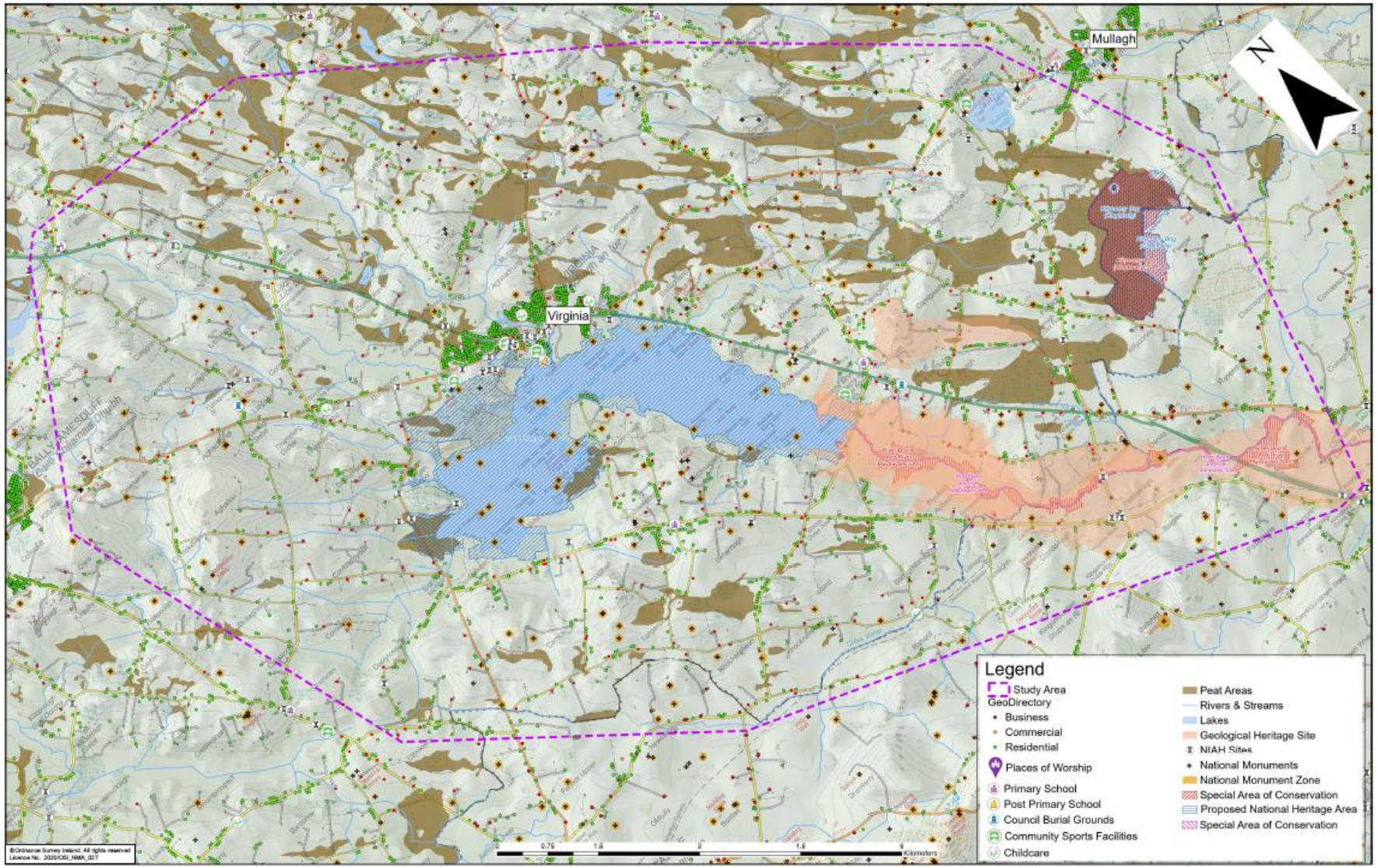


Figure 4-2 Combined Constraints

SECTION 5: CONSIDERATION OF ALTERNATIVES AND OPTIONS

5.1 Introduction

Article 5(1)(d) of the EIA Directive mentions that consideration of reasonable alternatives is a key part of an Environmental Impact Assessment Report (which may be prepared in Phase 3). It states:

"Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least) … a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment…".

As part of TII Phase 2, 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:

- Do-Nothing Option
- Do-Minimum Option ('The Base Case' as per the PAG)
- Public Transport Alternative
  - Bus
  - Rail
- Demand Management Alternative
- Active Modes Alternative
- Road Alternative
- Hybrid, Multi-Modal Transport Alternative
- Do-Something Option – Feasible Corridor

The alternatives and options were assessed against how they would meet and respond to the defined Scheme Objectives, which as per Section 2.3 (Project Specific Need) above were informed by the identified existing deficiencies and strategic policy.

5.2 Do-Nothing Option

In defining the Do-Nothing Option, TII's PAG Unit 4.0, states the following:

'*Note that the Do-Minimum is distinct from the Do-Nothing. The Do-Nothing assumes that there will be no other investment in the transport network (other than regular maintenance) during the appraisal period beyond that being considered as part of the scheme under appraisal*.'

Further to identifying and assessing the operational and safety issues of the existing N3 approaching and through Virginia, outline in Section 2.3 above, the Road Safety Impact Assessment concluded that this existing section of the N3 presents significant infrastructural deficiencies. As traffic volumes will likely 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.

The Do-Nothing option does not meet the project objectives set out in Section 1.5. The primary reasons include:

- The congestion within the Virginia Town centre results in high journey times and journey time unreliability, resulting in a failure to meet the strategic connectivity objective for the Scheme,
- The poor alignment and cross section for much of the N3 within the Study Area do not meet the required standards and results in poor safety,

- The poor / non- existent facilities for pedestrians and cyclists results in poor safety for non-motorised road users along the existing route,
- The concentration of traffic along the existing road causes severance through Virginia Town centre,
- The presence of high traffic volumes near an extremely high number of sensitive receptors along the existing road results in unacceptably high noise and air quality impacts,
- The retention of the existing road would result in no improvement in conditions, and likely a worsening of the wider economic conditions for both the Scheme and the town, and a failure to meet national and local planning policies (refer to Section 2.2).

Accordingly, the Do-Nothing option was eliminated from further consideration.

5.3 Do-Minimum Option

As per TII's PAG Unit 4.0 (October 2016), the Do-Minimum Option provides a baseline for establishing the impacts of all options and forms the basis of traffic assessment and its associated outputs as part of the Phase 2 Option Selection Process (See Section 3 of this Report). The Do-Minimum Option is referred to as the Base Case within the Common Appraisal Framework for Transport projects and Programmes (March 2016, updated October 2021).

The Do-Minimum Option must include the following features:

- The maintenance of existing facilities and services in the study corridor and region;
- The completion and maintenance of committed projects or policies in the study corridor that have successfully completed their environmental review; and
- The continuation of existing transportation policies.

The Do-Minimum option incorporates 'committed' projects by Cavan County Council such as the Virginia Street Enhancement works, currently under construction at the time of writing this report. However, the Do-Minimum option also does not meet the project objectives set out in Section 1.5 for the same primary reasons outlined for the Do-Nothing option above. It was concluded that the Do-Minimum option as defined in TII's PAG Unit 4.0 was not considered to be a feasible alternative.

5.4 Assessment of Alternatives and Alignment with NIFTI

An Assessment of Alternatives for the N3 Virginia Bypass scheme was carried out and the report is included in Volume 6 Part A. The objective of this report is to identify and consider the range of transport management and modal alternatives that may address the project objectives of the N3 Virginia Bypass scheme and to inform the selection of the most appropriate options to bring forward for further consideration. This has been done with reference to the Intervention Hierarchy outlined in the National Investment Framework for Transport in Ireland (NIFTI) which broadly dictates that sustainable mode enhancements should be prioritised where possible over road-based solutions to benefit private mode users. A summary of the alternatives considered, and subsequent conclusions and recommendations are outlined below.

5.4.1 Public Transport Alternative

In order to assess the potential demand for enhanced public transport services in the study area, a number of Public Transport enhancements were developed and assessed using the National Transport Authority's Eastern Regional Model (ERM).

Potential For Rail

Cavan County is served by its road network only. There are no operational railway lines in Cavan. The nearest functional rail connections are on the Dublin to Sligo line in Longford, Edgeworthstown and Mullingar, a minimum distance of 46km from Virginia, and on the Dublin to Belfast line in Drogheda and Dundalk, a minimum distance of 59km from Virginia. A freight line runs from Drogheda to Navan, approximately 38km from Virginia, serving the Tara Mines site. Given there is no existing rail line within the

study area or near Virginia, a rail-based solution is unlikely to be feasible in the short to medium term. It would require significant costs in terms of the infrastructure and planning required. Given the low density and dispersed nature of population and job centres within the surrounding area, a rail-based option is unlikely to have sufficient demand to make it viable. In terms of future development plans of rail infrastructure and services, the Government and Irish Rail have not outlined any specific objectives for the provision of new rail infrastructure within the Study Area. The 2030 Rail Network Strategy Review (2011), which outlines Irish Rail's future development requirements, makes no reference to any new rail routes within or within close proximity to the Study Area.

Bus Enhancements

The following is a list of the enhancements which have been modelled and analysed:

- Inter-Urban Bus - Increased frequency of existing inter-urban buses along the N3 serving Virginia (Bus Eireann Route 109x which runs from Cavan to Dublin city centre) to 4 buses per hour during peak periods.
- Local Bus – A new local bus service to exclusively serve the towns of Ballyjamesduff, Virginia and Bailieborough with a frequency of every 15 mins during peak periods.

These proposals are above the current Connecting Ireland Rural Mobility Plan proposals for the area which aim to maintain the existing level of service along the N3 corridor.

5.4.2 Demand Management Alternative

Transport Demand Management (TDM) is the implementation of programmes of measures which seek to change travel demand patterns by:

- **Land use measures** seek to provide for development which reduces car dependency and encourages the use of alternative modes.
- **Fiscal measures** can introduce financial incentives towards sustainable transport modes or financial disincentives to travel by car, particularly at peak periods.
- **Corridor based demand management strategies** can be very effective in ensuring the efficient operation of the strategic road network. The strategies can combine different demand management approaches and generally aim to make best use of Intelligent Transport Systems.
- **Traffic Management Measures** can also be effective in ensuring the efficient operation of the road network. These can take the form of restrictive measures which ban certain vehicle types through a corridor for various time periods or altogether. Or they can take the form of measures which seek to prioritise certain movements within a corridor. Some examples include Public transport only corridors; Banning HGV within certain areas; Speed limit reductions; Signal timing changes to priories strategic movements.
- **Parking management measures** include pricing and supply controls that make car use more expensive and less convenient, thereby increasing the relative attractiveness of non-car modes. Parking has a significant influence on people's travel behaviour. Transport demand management through parking restraint can be targeted to locations where accessibility by alternative modes is high thereby encouraging mode shift to public transport, walking and cycling. Parking restraint can also be applied as a fiscal measure or alongside land use planning measures.
- **Behavioural change programmes** are aimed at encouraging people to choose more sustainable transport options.
- **Information, education, promotion and outreach measures** that are aimed at raising awareness, improving understanding of the options available to help people to recognise the travel choices available to them can play an important role in overcoming barriers to switching from private car use to sustainable modes.
- One of the features of a successful transport network is how effectively and attractively the opportunities for **interchange between various transport services and modes** are presented.
- **Urban design** that creates a visually appealing urban environment is often very conducive to encouraging walking, cycling and public transport. A mobility friendly built environment includes a safe pedestrian environment, safe street crossings, easy to access public destinations, a mix of

housing choices, nearby health centres and recreational facilities, within high quality public realm and urban design.

Table 5-1 below is a shortlist of demand management measures appraised in the Assessment of Alternatives.

Table 5-1 Shortlisted Demand Management Measures

Demand Management Measure for Detailed Appraisal	Application for Virginia	Acceptability
Providing for a mix of land uses in close proximity to each other	A long-term strategic development plan, introduced in the town, designed to minimize the distance between residential, commercial and employment zones. This would act to reduce the overall use of non-active modes.	This measure would be beneficial to some extent but would take significant amount of time to put in place and would not resolve the main issues of high volumes of strategic traffic, contributing to congestion.
Counter commuting strategy	Strategy and list of measures developed to encourage people to work locally (eg. In remote working Hubs, etc) or work from Home.	This measure would improve conditions for local trips in urban areas but would not impact long-distance strategic traffic in the town.
Increased Parking Charges / Levies	Increase parking charges in the town centre in an effort to limit trips into the town by car. This could be applied along the length of the N3 as it runs through the town, in addition to adjacent roads/ car parks to promote alternative modes for shorter, internal trips in the town.	Analysis indicated that many internal educational trips are taken by active modes. But car is used mostly for work and external trips. Therefore, one of the main problems of high volumes of strategic traffic within the town wouldn't be resolved by this measure.
Signals / Traffic Management which penalises short trips over strategic trips	Alterations and introduction of signals within the town of Virginia aimed at penalising more local trips and improving journey times for strategic movements.	Introducing signals on the main roads in the study area would increase the current congestion, and would not alleviate the level of strategic traffic.
Banning HGVs	Banning HGVs (whilst protecting pickups and deliveries) through the town of Virginia.	This measure would be helpful to reduce the high levels of HGV traffic which travel through the town on a daily basis. But given the lack of alternative routes, this measure would only be acceptable as part of a combined solution which provided an alternative route.
Speed Limit Reduction	Reducing the speed limit for traffic travelling through the town of Virginia.	This measure would be helpful to make the town safer for pedestrians and cyclists but given the town is located on a strategic route (N3) and sees high volumes of traffic passing through it on a daily basis, this measure is only likely to acceptable as part of a combined solution which provided an alternative route which strategic traffic could use.
On – Street Parking Controls and Reallocating space for active modes	Restriction on parking along certain roads (including N3) throughout the town of Virginia and reallocating space where possible to dedicated active mode infrastructure.	This measure could be beneficial for some if that space was reallocated for use by active modes. But it is only likely to impact local trips and restricting parking on certain

Demand Management Measure for Detailed Appraisal	Application for Virginia	Acceptability
		roads could lead to increased parking in uncontrolled areas i.e. residential areas.
Flexible Working (Post Covid Behaviours)	The encouragement of flexible working pattern within the town of Virginia and the surrounding area to avoid peak hour trips	This measure would be beneficial to some people who can work from home but wouldn't impact those who don't have the option to work from home. This measure also would not alleviate the high levels of HGV traffic which travels through the town on a daily basis.
Work Place / Area wide Mobility Management Plans	Work Place MMP is an on-going strategy that facilitates, promotes, and encourages sustainable, active, and healthy modes of travel and helps reduce single-occupancy car use for journeys to and from a workplace. Area based MMPs cover a particular set of sites in an area that can be linked in order to increase the effectiveness of individual Mobility Management Plans.	This measure could be useful to certain businesses within the local area but is only likely to be effective to those who work locally and is unlikely to affect the high levels of strategic traffic which travels through the area.

5.4.3 Active Modes Alternative

The following is a list of the active modes that have been appraised in the Assessment of Alternatives:

- Segregated pedestrian/cycle network with continuous cycle track through settlements.
- Off road pedestrian/cycleway following similar routes as the N3.

5.4.4 Multi-Modal/Hybrid Options

In addition to the options described above, several multi-modal/hybrid options were also assessed using the NIFTI process. The flow chart below shows a summary of the options considered and the process followed. The process is described in more detail in Volume 6 Part A.

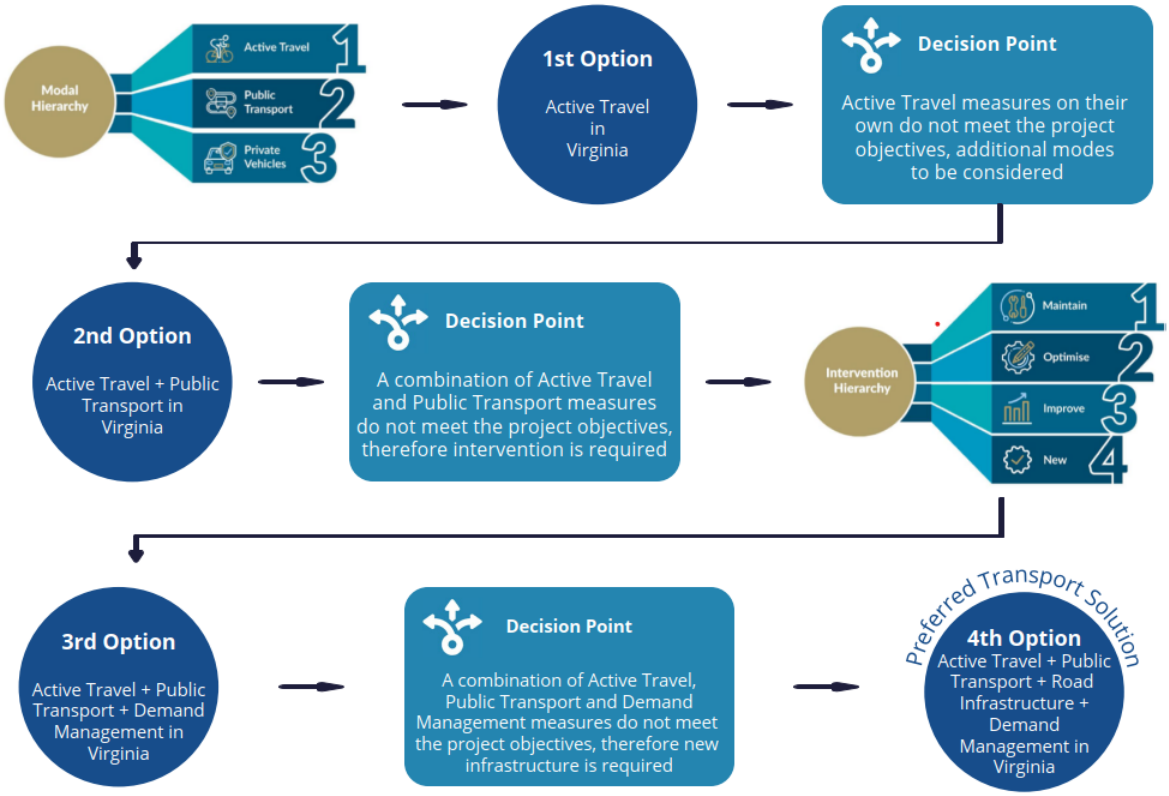


Figure 5-1 Multi-Modal Options Assessed using NIFTI

5.4.5 Conclusion

Summary

The Assessment of Alternatives has drawn upon a wide range of spatial and statistical data and traffic modelling tools to analyse the demand for travel in the study area. The baseline review process used several analytical tools to quantify the existing number of trips by each transport mode and identify the key desire lines of travel from origin to destination.

The Assessment of Alternatives was focused on the selection of an appropriate primary mode of transport for the intervention which would fulfil the project objectives. An assessment which follows the NIFTI Intervention Hierarchy and a Multi-Criteria Analysis assessment was conducted on various modes and combination of modes, which drew upon the evidence presented in the baseline review and initial modelling analysis to assess the suitability of different solutions and combinations of solutions in achieving the project objectives.

The Potential Solutions assessment which aligns with NIFTI, assessed different options and combinations of options by improving the existing network and prioritising sustainable mode enhancements where possible over road based solutions to benefit private mode users, while the MCA looked at the suitability of each mode according to the six DoT Common Appraisal Framework criteria (Economy, Safety, Environment, Accessibility and Social inclusion, Integration and Physical Activity) against the project objectives. Table 5-2 below shows the MCA summary of the measures appraised in the Assessment of Alternatives.

Table 5-2 Assessment of Alternatives MCA Summary

Mode of Transport	Road	Bus	Rail	Demand/ Traffic Management	Active Modes	Hybrid Option (Road / PT / DM / Active Modes)
Economy	High Preference	Medium Preference	Low Preference	Low Preference	Low Preference	High Preference
Safety	High Preference	Medium Preference	Low Preference	Low Preference	Medium Preference	High Preference
Environment	Medium Preference	Medium Preference	Low Preference	Low Preference	Medium Preference	Medium Preference
Accessibility & Social Inclusion	Medium Preference	Low Preference	Low Preference	Low Preference	Low Preference	High Preference
Integration	High Preference	Medium Preference	Medium Preference	Low Preference	Low Preference	High Preference
Physical Activity	Medium Preference	Low Preference	Medium Preference	Low Preference	High Preference	High Preference
Preferred Mode	**No**	**No**	**No**	**No**	**No**	**Yes**

The conclusion of the Assessment of Alternatives analysis is that a hybrid multi-modal transport solution which comprises potential road, public transport (bus), demand management, active travel facilities and transport park and share hubs (mobility hubs) is the most appropriate solution to achieve the project objectives.

The proposed N3 Virginia Bypass scheme developed as a hybrid multi-modal transport solution will therefore align with Tiers 1 and 3 of the NIFTI Modal hierarchy and Tier 4 of the NIFTI intervention hierarchy. The removal of strategic traffic from the town will also enable measures to achieve alignment with Tier 2 (Demand Management) and Tier 3 (Active Travel) of the NIFTI intervention hierarchy.

Recommendation

After considering all alternatives, it was recommended that the project should proceed through Phase 2 with a hybrid based multi-modal transport solution which comprises potential road, public transport (bus), demand management and active travel facilities on the basis of the MCA presented in Table 5-2 above and in Section 6 of the Assessment of Alternatives Report included in Volume 6 Part A. The analysis made it clear that a multi-modal transport solution is the best placed, in comparison with the alternatives, as the primary mode to achieve the project objectives and support the development of the region.

5.5 Do-Something Option – Feasible Corridor

TII's PAG Unit 4.0 defines a Do-Something Option 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, 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'. The 'systematic assessment' namely being Stages 1 to 3 of the Option Selection Process (TII's PMG Phase 2), which is described in detail in Section 6 to 10 of this Report.

The provision of a dedicated pedestrian and cycle facility adjacent to the proposed mainline was included as part of all feasible corridors during Stage 1 and Stage 2.

SECTION 6: METHODOLOGY FOR PHASE 2 OPTION SELECTION PROCESS

6.1 Introduction

This section summarises the common methodology that applies to the Phase 2 Option Selection process. This covers the following steps in the process:

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

Details specific to each stage in the process for each section of the project are provided in the Section 8, 9 and 10.

6.2 Stage 1 Preliminary Options Assessment

6.2.1 Introduction

Following completion of the constraints study (Section 4) and the elimination of the unreasonable alternatives (Section 5), preliminary options were identified for the project to be taken forward to the Stage 1 process. These options were comparatively assessed within a matrix to determine the proposed options to be carried forward to Stage 2.

6.2.2 Methodology

At the outset of option development, basic plan designs were developed by navigating between constraints as much as reasonably practicable to develop preliminary options which were identified as being potentially feasible and within the Study Area. Each option had an overall corridor width of 300m and provided the indicative boundaries within which a road could be constructed, and which allowed for refinement of routes within the option to facilitate improvements in alignments that would reduce overall impact and provide overall benefit for the project.

In the development of the preliminary options for assessment purposes, the proposed horizontal and vertical alignments for all preliminary options (mainlines only) were developed using road design software to ensure that potential alignments fall within the required standards, and to derive realistic estimates of raw earthworks quantities (cut/fill) for each option. The Stage 1 assessment was carried out on end-to-end options. Several option connectors were also identified which resulted in a combination of different options which were labelled as links, the details of which are discussed in more detail in Section 8.

Potential side roads were also identified. The cross-section considered for the project at this stage comprised of Type 2 Dual Carriageway (CC-SCD-00005).

6.2.3 Matrix Development

Each of the Do-Something Feasible Corridor Options were assessed against the Stage 1 Preliminary Options Assessment criteria: Engineering, Environment and Economy. Within the Engineering and Environment criteria, sub-criteria were developed to aid the assessment. The Economy criteria was assessed under the option Scheme cost only. The Environment sub-criteria were structured to align with the EIA Directive to ensure consistent approach in Phase 2 environmental assessment (Stage 1 and Stage 2) and Environmental Impact Assessment (that may be held in Phase 3), as discussed in Section 8.3.

Thresholds were identified for each of the Engineering and Environment sub-criteria to allow a comparative analysis of each. The various thresholds are listed in Section 8.

The scoring procedure to assess the options followed the TII Guidance Document PE-PAG-02031 Multi Criteria Analysis. The amount of information available at Stage 1 of the Options Selection phase of the project did not allow for a comprehensive quantitative assessment and so the 7-point scoring method set out in the guidance document was simplified to a 3-point method for use in the Stage 1 assessment. This methodology ensured that a fair and reasonable assessment of the options could be undertaken based on the amount of information available, thereby reducing the amount of subjective variation in assessment. All options identified were assessed in terms of High, Medium and Low Preference against the other options under the main headings of Engineering, Environment and Economy.

It is noted that Unit 7.0 - Multi Criteria Analysis of the TII Project Appraisal Guidelines states that "the preference scores for each of the main criterion is equal to the sum of the scores for each sub criterion". However, this approach of summing the preference scores would have resulted in the comparison between options becoming distorted, as the Economy criterion only had 1 sub-criterion whereas the Engineering and Environment criteria had a number of sub-criteria.

Each of the sub-criteria were given a high (green), medium (orange) or low (red) preference. A scoring system of 3, 2 and 1 were applied for the high, medium and low preferences, respectively. Average scores were calculated for each option based on the number of greens, oranges and reds. The approach taken in terms of averaging the scores for each of the main criteria as opposed to summing them therefore ensured that all three of the main criteria had equal weighting as part of the analysis, with no bias towards any one of the three main criteria. Hence, the approach taken provided a more reasonable basis for comparison between the options.

The values for the different criteria and sub-criteria were inputted for each option into a matrix in order that the full range of values could be objectively assessed between the different preliminary options. It should be noted that the average scores were not directly utilised in choosing options, but to give an indication of the overall performance of each option for consideration during comparison and shortlisting. The significance of individual impacts was also a consideration in identifying options to be shortlisted.

6.3 Stage 2 Project Appraisal Matrix

6.3.1 Introduction

Following completion of Stage 1 (as detailed in Section 8), a shortlist of options was identified for the project to be taken forward to the Stage 2 process (as detailed in Section 9). All shortlisted options were identified as being feasible and having greater benefit / lower impact than the options eliminated at the end of Stage 1.

At the beginning of Stage 2, the shortlisted options were further developed to include preliminary designs for link roads, termination junctions, etc. Further refinement and improvements were made to reduce impacts where feasible. Following this further refinement, a more detailed assessment of each of the shortlisted options was then undertaken, using the six Department of Transport Common Appraisal Framework (CAF) criteria and the relevant sub-criteria (listed below). Additionally, the Stage 2 appraisal included the Stage F Road Safety Audit and Road Safety Impact Assessment. These elements are required under TII PMGs (2019) to inform the option selection. The Environment sub-criteria were structured to align with the EIA Directive to ensure consistent approach in Phase 2 environmental assessment (Stage 1 and Stage 2) and Environmental Impact Assessment (that may be held in Phase 3), as discussed in Section 9.4.

Economy

- Transport efficiency and effectiveness.
- Wider economic impacts.
- Transport Quality & Reliability.
- Funding impacts.

Safety

- Collision Reduction.
- Security.
- Road Safety Audit.
- Road Safety Impact Assessment.

Environment

- Air Quality & Climate.
- Noise.
- Landscape & visual.
- Biodiversity (Terrestrial and Aquatic).
- Waste.
- Soils, Geology and Hydrogeology.
- Hydrology.
- Cultural Heritage.
- Material Assets (Agricultural).
- Material Assets (Non-agricultural).

Accessibility & Social Inclusion

- Deprived geographical areas.
- Vulnerable groups.

Integration

- Transport integration.
- Land use integration.
- Geographical integration.
- Other government policy integration.

Physical Activity

- Health benefits.
- Journey ambience benefits.
- Changes in the number of incidents.

The project appraisal of options followed the relevant TII Guidance documents produced for the different elements of consideration, in accordance with the TII PMGs (2019) and the Project Appraisal Guidelines for National Roads Unit 7.0 – Multi-Criteria Analysis, PE-PAG-02031 (2016).

6.3.2 Methodology

The methodology for Stage 2 Project Appraisal of shortlisted options is described in the following paragraphs. The appraisals are presented in the relevant Sections of this report.

High level preliminary designs were developed for each option, including vertical and horizontal alignments, to enable a high-level assessment to be completed for the feasible road alignment within each option corridor. The option corridor widths remained at 300m to enable further refinement of the Preferred Option in Stage 3.

The appraisal criteria listed above were individually assessed by competent experts. The assessments are a combination of quantitative and qualitative processes, with a high emphasis placed on detailed expert opinion used in the assessments of each option. The assessment was carried out using nodes and segments for a combination of different options, the details of which are discussed in more detail in Section 9.

The approach taken was a comparative analysis between the options corridors. All of the option corridors were appraised in accordance with relevant TII Publications. The impact score has been based on the likely

impact of each option under the various headings. Section 2 of the PAG Unit 7.0, PE-PAG-02031 (October 2016), provides a recommended scoring system. Each impact is scored on a scale of 1 (major or highly negative impact) to 7 (major or highly positive impact). A score of 4 represents a neutral or not significant impact.

Within each discipline, the relevant specialist has assessed options based solely on the extent of an option's potential to impact on that discipline as per the PAG. Following both a quantitative and qualitative assessment within each sub-criterion outlined in the PAG, each option has been given an overall impact score as per Table 6-1.

Table 6-1 Impact scoring system used in the appraisal of Options during Stage 2

Scoring	Impact Level
7	Major or Highly Positive
6	Moderately Positive
5	Minor or Slightly Positive
4	Not Significant/Neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or Highly negative

Subsequently, each option has been ranked and a preference determined. Preferences are grouped into one of three types:

- Preferred.
- Intermediate.
- Least Preferred.

For some options there will be very little difference between their impact score, and some may have the same impact score. In such circumstances the relevant specialist has applied expert judgement and evaluated each option comparatively against the other options considering the quantitative and qualitative assessments. This has allowed the relevant specialist to determine a preference for each option. In some instances, similar options may have the same preference.

The above process has been followed for each sub-criterion as set out in PE-PAG-02031 and listed in Section 6.3.1 above.

6.3.3 Project Appraisal Matrix

Following the completion of the above process, the individual impact scores for each option under each sub-criterion are compiled into a Project Appraisal Matrix. The impact scores under each sub-criterion are summed to give a total impact score for each option. The higher the score the better the option performs in terms of the appraisal. On this basis a high-level ranking of options can be obtained. Unit 7.0 of the PAG (PE-PAG-02031) states (p.3):

"*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.*"

A secondary appraisal matrix is also undertaken at this point to determine other factors that may inform a decision on the Emerging Preferred Option. The preferences (preferred, intermediate, least preferred) for each option under each criteria are examined and presented.

Where an option clearly stands out in terms of the Project Appraisal Matrix (sum of the impact scores) and relevant specialist preference, then this option will be considered as the Emerging Preferred Option. Where there is little between two or more options based on the matrices and preferences, then a further pairwise appraisal was undertaken to determine the Emerging Preferred Option. The pairwise appraisal looks at the top two or more options in order to determine their relative advantages and disadvantages to each other. From this process, an Emerging Preferred Option will be decided based on the option that performs the best against the project objectives.

6.4 Stage 3 Preferred Option

The Stage 2 process results in the identification of a Preferred Option. At Stage 3 a Project Appraisal Balance Sheet (PABS) is developed for the Preferred Option in accordance with Unit 7.0 – Multi Criteria Analysis, Section 4.3 (PE-PAG-02031, dated 2016, p.24).

The six CAF criteria used in Stage 2 are used for the Stage 3 appraisal which is carried out in accordance with Unit 7.1 of the Project Appraisal Guidelines (PE-PAG-02032, 2016). TII has developed an automated spreadsheet for use in the PABS. The PABS provides a summary appraisal of project impacts based on the outputs of the quantitative and qualitative assessment carried out as part of the Multi Criteria Analysis (MCA) assessment in Stage 2.

SECTION 7: NON-STATUTORY PUBLIC CONSULTATIONS

7.1 Introduction

Non-Statutory Public Consultation forms a key part of the TII Phase 2 process, where a number of 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.

Three Non-Statutory Public Consultations were undertaken during the Phase 2 process; during the middle of Stage 1, the beginning of Stage 2 and the end of Stage 2:

- Public Consultation No. 1 – Constraints & Initial Preliminary Options – March 2020
- Public Consultation No. 2 – Shortlisted Option Corridors – November 2020 to January 2021
- Public Consultation No. 3 – Emerging Preferred Option – August & September 2021

A brief summary of these consultations is provided in the Sections below. In addition to summaries of each one of the three public consultations, this Section provides a general overview of the public consultation process that took place during Phase 2. A summary list of the Statutory Bodies who were contacted as part of this process is provided at the end of the Section.

7.2 Public Consultation No. 1 – Constraints & Initial Preliminary Options

The first Public Consultation presented the Study Area for the scheme, the constraints identified within the study area and initial preliminary option corridors. The first Public Consultation took place over two days, from 2pm to 8pm on the 11th and 12th March 2020 in the Virginia Show Centre. The consultation was advertised on local radio, social media and advertised in the Anglo Celt and Meath Chronicle newspapers. A pre-consultation briefing took place with the Elected Representatives in Cavan and Meath in advance of the public consultation event. These were carried out on the 26th February 2020.

The event was attended by elected members, landowners, stakeholders and members of the public. Feedback forms were made available online on the project website https://www.n3virginiabypass.ie. Feedback could also be provided by emailing the project team using the project email address. The information uploaded on the website for Public Consultation 1 included:

- N3 Virginia Bypass Study Area
- Preliminary Combined Constraints
- Stage 1 Option Corridors and Townland Boundaries
- Combined Constraints and Stage 1 Option Corridors
- Public Consultation No.1 – Brochure
- Public Consultation No.1 – Questionnaire
- Public Consultation No.1 – Online Feedback Form

Feedback forms were initially due to be returned or completed online by 27th March 2020. Due to Covid-19 restrictions, the deadline for return of feedback on this project was extended, initially to 17th April 2020 and then further extended until 22nd May 2020 following the extension of restrictions. The public was advised of these extensions to the deadline via local radio, social media, local newspapers and the project website.

7.2.1 Feedback from Public Consultation

For the first Public Consultation, the project team tailored a bespoke Feedback form/Questionnaire to extract local knowledge of constraints thus allowing the team to correlate results with existing constraint registers/databases. In addition, information was sought to understand Trip generation / Mode of Transport within the study area and also asking questions as a measure to determine if there was public support for the scheme.

Table 7-1 shows the quantity of feedback received through each channel during the consultation period. There were 229 responses in total. One feedback form provided group feedback on behalf of residents of Whitegate, Edenburt & Fartagh, Virginia. One submission provided group feedback on behalf of 174 listed residents / owners of properties, lands and / or businesses impacted by the Light Green East Option Corridor. The breakdown of submissions received is outlined in the table below.

Table 7-1 Public Consultation 1 Feedback

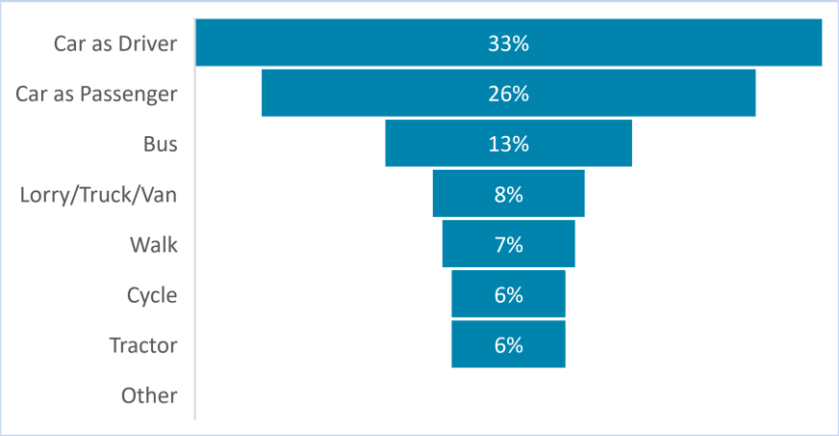
Attendance at PC1 Event	Feedback Forms (online and by post)	Email Submissions
386	194	35

All feedback received by the project team as part of this consultation was recorded and reviewed for consideration. The potential for exclusion of traffic from the town centre was welcomed by a large proportion of the respondents.

A summary of the survey outputs is shown below:

- 91% of submissions identified as being residents of the Study Area.
- 50% of submissions identified as Working within the Study Area.
- 72% of submissions identified local Constraints.
- 67% of submissions agreed the N3 Virginia Bypass was necessary.
- 71% of submissions stated that respondents travel along this section of the N3 Daily.

Table 7-2 Results from Mode of Transport Question



The main constraints and concerns highlighted in the feedback included flooding, boglands, ecological habitats, wells, archaeology, inclusion of circuitous route options, proximity of some options to the town, cost, consideration of public transport options, noise and vibration, loss of farmland, severance and impact to farm operations.

7.3 Public Consultation No. 2 – Shortlisted Options

The second Public Consultation presented the short list of options that were established following the Stage 1 Preliminary Options Assessment.

The second Public Consultation commenced on the 11th November 2020 and continued until 15th January 2021, having been extended from the original close date of 23rd December 2020. No physical event took place due to Covid-19 restrictions. As an alternative to a physical consultation event, a virtual public consultation room was set up to display the information relating to the shortlisting of options. Project information was also available online on the project website www.n3virginiabypass.ie and was placed on

display in Virginia Town, including in the front window of Virginia Show Centre, in the poster boxes at Ramor Theatre and on a display board on the island in front of Virginia courthouse.

Separate online pre-consultation briefings were held with the Elected Representatives in Cavan (Ballyjamesduff MD) and Meath (Kells MD) in advance of the public consultation event. These briefings took place on the 3rd November 2020.

The consultation was advertised on local radio and advertised in the Anglo Celt newspaper on 12th and 19th November 2020 and in the Meath Chronicle newspaper on 14th and 21st November 2020. In addition, a number of VMS signs were set up around Virginia to advertise that there was an update on the project website.

During the consultation period, when reports that some members of the public were not aware of the consultation, a decision was made to engage a bulk mail delivery company to deliver a pack, containing an information pack and a questionnaire, to all properties within the Study Area.

An online feedback form was set up using Microsoft Forms and linked on the virtual room and project website. Feedback forms were made available for download on the project website. Feedback could also be provided by emailing the project team using the project email address. The information uploaded on the website for Public Consultation 2 included:

- Interactive Map of Short List of Options
- Public Consultation No.2 – Brochure.
- Public Consultation No.2 – Feedback Form.
- Stage 2 Option Corridors
  - Combined options
  - Individual Options
    - Option A Corridor (Green)
    - Option B Corridor (Purple)
    - Option C Corridor & Variants (Red)
    - Option D Corridor & Variant (Orange)
    - Option E Corridor & Variants (Pink)

7.3.1 Feedback from Public Consultation

Table 7-3 shows the quantity of feedback received through each channel during the consultation period.

Table 7-3 Public Consultation 2 Feedback

Attendance at online / telephone meetings	Feedback Forms (online and by post)	Email Submissions
122	497	165

All feedback received by the project team as part of this consultation was recorded and reviewed for consideration.

Reaction to feedback on Option B under the umbrella of Heritage/Archaeology instigated a site survey at Derver to correlate records of charted/yet to be charted Archaeology/monuments. Feedback from local knowledge identified two areas with uncharted graveyards, although the Ring Fort at this location was known, it was evident from the site investigation that the area was rich in historical features and evidence of a substantial early settlement was observed.

Feedback from a resident on Option E identified a building recorded in the National Inventory of Architectural Heritage. (Option E – Bailieborough Road – 2 Storey farmhouse and attached public house circa 1820 Reg No:40403909).

The 2003 N3 Virginia Bypass, (similar to Option C), that previously obtained Part 8 approval featured in a number of submissions received and it was evident that the 2003 scheme was considered to be a viable option. However, a number of submissions raised concerns regarding the proximity of properties-built post 2003 to the scheme and the potential negative visual and noise impacts.

Minor re-alignments of corridors were considered based on feedback received, considerations were given on Options D and E to avoid a relatively new dwelling and Ring Fort in proximity to a property.

Early Site Investigation works (ground Probes) across circa 400 individual locations throughout the Study Area enabled the project team to meet and engage with landowners/farmers on the ground allowing landowners the opportunity to engage with the project team and feedback their concerns/discuss potential impacts.

Support for the scheme was evident from the feedback received, however concerns were raised on all Options regarding the following:

- Effect on Agriculture
- Potential effect on Flora and Fauna
- Air Quality/Noise
- Impact on communities
- Proximity of property to potential Emerging Preferred Option
- Landscape/Visual amenity
- Benefit to Virginia Town
- Current Aquifer
- Reduction in traffic counts Post COVID-19 and Brexit
- Local Monuments – Ring Forts, Fairy Rings

Support for the project in general was positive.

Planning

Concerns were raised regarding the study area being sterile/protected in respect of processing Planning applications and the impact this was having on both Agricultural development and individual residential improvement/development.

Water Supply

It was also evident from the feedback received that potable water for the study area is supplied from the following sources:

- Public Supply
- Private Well (Shallow)
- Group Water Scheme
- Private Well (Bored)

From research and feedback received throughout the public consultation it was noted that the study area is anecdotally rich in biodiversity and archaeology, and local feedback identified areas which required further investigation.

Awareness of the Consultation

Comments were received advising that the publicity of the consultation had not reached all members of the public that may be affected by the project.

The project team considered that a robust approach should be adopted to advertise the Public Consultation No. 2 during a time of Covid-19 movement restrictions. The standard approach of advertising on radio, in local newspapers and on social media was adopted and was further supplemented by display drawings visible outdoors at three locations within Virginia, notice of the project update on VMS signs around Virginia and then further supplemented by a letter drop to all occupied residential properties within the study area, where access to letter boxes was available.

Covid-19

A number of comments were received that the Public Consultation No. 2 should be suspended to a time post Covid-19 restrictions.

The project team considered that, given the level of feedback from the public outlined in Table 7-3 above, Public Consultation No. 2 was robustly advertised to give all interested stakeholders the opportunity to enquire and make a submission about the scheme.

Petitions

Five petitions were submitted objecting to individual Options.

- Option B – 2 separate petitions.
- Option C – 1 separate petition.
- Options D/E – 2 separate petitions.

7.4 Public Consultation No. 3 – Emerging Preferred Option Corridor

The third Public Consultation presented the Emerging Preferred Option Corridor that was established following the Stage 2 Project Appraisal Matrix.

The third Public Consultation commenced on the 19th August 2021 and continued until 13th September 2021. With the easing of Covid-19 restrictions, this consultation consisted of a virtual consultation room supplemented with restricted in person meetings.

Advance notice of Public Consultation No. 3 was published on Cavan County Council social media platforms, Cavan County Council and N3 Virginia Bypass websites, local Radio (Northern Sound and LMFM), and local Newspapers (Anglo Celt and Meath Chronicle). This advance notice advised that the Emerging Preferred Option would be available for viewing on Thursday 19th August 2021 at 2pm and that in-person meetings could be arranged in the Virginia Show Centre by appointment only from Thursday 19th August to the 3rd of September 2021. Online and Telephone meetings with the Project Team were also available.

Information packs were delivered by registered post to 260 PRAI registered property owners affected by the Emerging Preferred Option corridor to arrive on or just after Thursday the 19th of August. The remaining members of the public in the study area being notified by a leaflet drop with circa 3600 being delivered. A number of VMS signs were also put in place around Virginia from 19th August to 3rd September to advertise a project update.

In the week following the commencement of Public Consultation No. 3 a notice was placed in the Anglo Celt and Meath Chronicle advertising the Emerging Preferred Option and details of how to get in contact with the Project Team in relation to the scheme.

A presentation in relation to Public Consultation No. 3 was given to the Elected Representatives of Cavan County Council on the 16th August 2021, and to the Elected Representatives of the Kells Municipal district on the 18th August 2021.

An online feedback form was set up and linked on the virtual room and project website. Feedback forms were made available for download on the project website. Feedback could also be provided by emailing the project team using the project email address. The information uploaded on the website for Public Consultation 3 included:

- Interactive Map of Emerging Preferred Option Corridor
- Public Consultation No.3 Brochure
- Public Consultation No.3 Feedback Form
- Emerging Preferred Option Corridor
- Emerging Preferred Option Corridor (OS Vector & Aerial)

7.4.1 Feedback from Public Consultation

Table 7-4 shows the quantity of feedback received through each channel during the consultation period.

Table 7-4 Public Consultation 3 Feedback

Attendance at online / telephone meetings	Feedback Forms (online and by post)	Email Submissions
114	66	39

All feedback received by the project team as part of this consultation was recorded and reviewed for consideration.

Support for the scheme is evident from the feedback received however concerns were raised regarding the following: -

- Effect on Agriculture
- Potential effect on Flora and Fauna
- Air Quality/Noise/artificial light at junctions
- Impact on communities
- Proximity of property to Emerging Preferred Option
- Landscape/Visual amenity
- Benefit to Virginia Town
- Current Aquifer
- Location of the junction at the Northern end of the Scheme at Lisgrea
- Effect on Carrigabruise National School
- Proximity of the R178 Junction to the Drumlins Estate

Support for the project in general was positive.

Planning

Concerns were repeated in regard to the study area being sterile/protected in respect of processing Planning applications and the impact this was having on both Agricultural development and individual residential improvement/development.

The Drumlins, Virginia

Residents of the Drumlins estate off the R178 Bailieborough road reported concerns in regard to the effect the scheme may have on their environment, in regard to noise, air quality, artificial light. Most feedback received from residents referred to a negative effect on the value of their property should the Emerging Preferred Option be progressed.

Access to N3

Throughout the length of the scheme residents inquired how access to the existing N3 will be achieved post

construction and which parts of the current N3 maybe a Cul-De-Sac.

Lisgrea Terminal

Farmers/residents at the northern end of the scheme (Lisgrea) have concerns as to the effect on local farms and impact on local business and potential safety, noise, air quality, artificial light pollution dependant on the location of the proposed junction at this location.

Carrigabruise National School

Carrigabruise National School raised concerns for safety, noise, air pollution and potential impact the scheme may have on the school and were concerned about access to the school post construction.

Alignment

Many comments were received relating to the design element of the scheme advising it would have been preferential to have certain elements designed at phase 2 such as side road arrangements, access, junction types and mainline alignment.

7.5 Consultation with Statutory Bodies

In addition to non-statutory stakeholders, the Project Team contacted and provided advance notification and information pertaining to the non-statutory public consultation events to the Prescribed Bodies listed in Table 7-5. It should be noted that the Office of Planning Regulator (OPR) was consulted during PC1 where it was suggested that this Scheme does not fall within the statutory remit of the OPR and therefore, it would be of no benefit to direct future similar correspondence to them. Similarly, the Road Safety Authority indicated during PC2 that as the project is recognised as “engineering” in nature, it fell outside their area of control “education” and that Transport Infrastructure Ireland and the local authorities were the appropriate bodies concerned.

Table 7-5 List of Consulted Bodies for the N3 Virginia Bypass Scheme

Prescribed Bodies		
The Arts Council	Fáilte Ireland	An Taisce
Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media	The Heritage Council	Inland Fisheries Ireland
Transport Infrastructure Ireland	Meath County Council	Northern & Western Regional Assembly
Waterways Ireland	Irish Aviation Authority	Environmental Protection Agency (EPA)
Department of Agriculture, Food and the Marine	Department of the Environment, Climate and Communications	Irish Water
Department of Housing, Local Government and Heritage	Office of Public Works (OPW)	Geological Survey of Ireland (GSI)
Road Safety Authority (RSA)	Royal Irish Academy: Committee for Historical Studies	National Museum of Ireland
Teagasc	Office of the Planning Regulator	Cavan County Council

Prescribed Bodies		
ESB	CMM Group Water Scheme	Gas Networks Ireland
Coillte		

SECTION 8: STAGE 1 – PRELIMINARY OPTIONS ASSESSMENT

This section represents the Phase 2: Stage 1 - Preliminary Options Assessment – Scoring Criteria & Elimination Working Paper for the N3 Virginia Bypass and is developed in accordance with the requirements of the Transport Infrastructure Ireland (TII) Project Management Guidelines (January 2019), Project Appraisal Guidelines (PAG) Unit 4.0: Consideration of Alternatives and Options and PAG Unit 7.0: Multi Criteria Analysis (both October 2016). The methodology was outlined in Section 6.

8.1 Preliminary Options

Do Minimum

A Do Minimum option was considered as part of the options assessment. This Do Minimum would consist of a combination of online and offline improvements either side of Virginia Town, utilising sections of the existing N3 and upgrading as necessary. Within the extents of Virginia Town, it was likely that improvements would consist of traffic management solutions. Considering future traffic growth, a Type 2 Dual Carriageway cross-section was considered necessary to accommodate the daily traffic volumes and provide a Level of Service of D along the N3. This presents additional challenges in designing and constructing online road upgrades due to the built-up nature of Virginia Town, numerous existing accesses, and ribbon development along the existing N3. Constructing online improvements would therefore have a substantial direct impact on many properties. Severance of the existing road network could also result in an extensive new local/access road network to accommodate existing properties. In accordance with TII Publications (Technical) PE-PMG-02042, the Do Minimum option shall be brought forward from the Stage 1 (Preliminary Options Assessment) process and assessed in more detail at Stage 2 – Project Appraisal Matrix.

Do Something:

In early 2020, a number of initial preliminary do-something options were developed to avoid as many built, natural and other physical constraints as possible and to meet the objectives of the project. The study area, identified constraints and initial options were presented to the public at Public Consultation Number 1 on March 11th and 12th 2020. Ten offline options and an option to consider online and traffic management improvements were presented. Several option variations that include linkages between the main options were also presented.

Subsequent to the public consultation, the horizontal and vertical alignments were developed taking into account feedback from the public consultation and also to examine impacts on the collated constraints in more detail. In order to develop a vertical alignment, preliminary ground level information within the study area was acquired via historic LiDAR surveys which was used to generate a preliminary 3-dimensional digital terrain model. Additional link options were developed as the project progressed.

In developing the vertical alignments, preliminary assumptions were made for each option as to potential junction locations, extent of link roads to the existing road network, side road crossings and realignments, river crossings and the like. The preliminary designs that were developed established the various engineering elements for comparison of options. There were ten main options developed. From these options, several links and variations between the main options were also developed. These links resulted in an additional 19 options. In total there were 29 preliminary offline options considered. The preliminary options developed for the Stage 1 preliminary options assessment are described in Table 8-1and shown in Figure 8-1 below.

Table 8-1 Stage 1 Options & Links

Option Name	Option Description
Option 01 Red	East of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Lisgrea north of Lisgrea cross. This option closely follows much of the route of the original N3 Virginia Bypass that received Part 8 approval in 2003.
Option 02 Purple	East of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Killyduff.
Option 03 Cyan	East of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Killyduff.
Option 04 Blue	East of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Killyduff.
Option 05 Light Green	East of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Billis.
Option 06 Magenta	West of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Lisgrea.
Option 07 Orange	West of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Killyduff.
Option 08 Blue	West of Lough Ramor/Virginia. Commences 2.5km south of the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Killyduff.
Option 09 Red	West of Lough Ramor/Virginia. Commences 2km south of the existing N3/R147 roundabout at Derver, rejoining the existing N3 at Drummallaght.
Option 10 Yellow	East of Lough Ramor/Virginia. Commences at the existing N3/R147 roundabout at Derver, passing to the west of the existing N3. Crosses the N3 at Burrenrea, passing to the east of Virginia rejoining the existing N3 at Killyduff.
Link 1	East of Lough Ramor/Virginia. Commences with Option 01 Red, then deviates to the east at Drumheel before linking back to Option 01 at Aghnadrung near Virginia.
Link 2	East of Lough Ramor/Virginia. Commences with Option 02 Purple, then deviates to the east at Carrigabruse to link to Option 04 Blue at Corfad.
Link 3	East of Lough Ramor/Virginia. Commences with Option 03 Cyan, then deviates to the south-west at Cloghbally Lower before linking back to Option 03 at Cornashesk.
Link 4	East of Lough Ramor/Virginia. Commences with Option 05 Light Green, then deviates at Fartagh to link to Option 04 Blue at Cloghbally Lower.
Link 5	East of Lough Ramor/Virginia. Commences with Option 04 Blue, then deviates to the south at Corfad to link to Option 03 Cyan at Cornashesk east of Virginia.
Link 6	East of Lough Ramor/Virginia. Commences with Option 04 Blue, then deviates to the north at Corfad before linking back to Option 04 at Murmod.
Link 7	East of Lough Ramor/Virginia. Commences with Option 04 Blue, then deviates to the south at Burnew to link to Option 03 Cyan at Drumagolan north of Virginia.
Link 8	West of Lough Ramor/Virginia. Commences with Option 08 Blue, before deviating west at Clonasillagh to link to Option 09 Red at Newcastle.
Link 9	West of Lough Ramor/Virginia. Commences with Option 06 Magenta, before deviating west at Clonasillagh to link to Option 09 Red at Rahard.
Link 10	West of Lough Ramor/Virginia. Commences with Option 08 Blue, before deviating north at Croaghan to link to Option 06 Magenta at Crossafehin.
Link 11	West of Lough Ramor/Virginia. Commences with Option 08 Blue, before deviating at Curraghmore to join the existing N3 at Drumagora.

Option Name	Option Description
Link 12	West of Lough Ramor/Virginia. Commences with Option 07 Orange, before deviating west at Aghacashel near Ballyjamesduff to link to Option 09 Red at Lattoon.
Link 13	West of Lough Ramor/Virginia. Commences with Option 09 Red, before deviating at Aghaloughan to join the existing N3 at Killyduff.
Link 14	East of Lough Ramor/Virginia. Commences with Option 04 Blue, then deviates to the south at Corfad to link to Option 01 Red at Aghnadrung near the R178 Bailieborough Road.
Link 15	East of Lough Ramor/Virginia. Commences with Option 03 Cyan, then deviates at Cloghbally Lower to link to Option 04 Blue, before deviating at Burnew to tie in to the existing N3 at Lisgrea in the same location as Option 01 Red.
Link 16	West of Lough Ramor/Virginia. Commences with Option 07 Orange, deviating on to Option 08 Blue at Clonasillagh, and then Option 06 Magenta at Cormaddyduff to the west of Lough Ramor.
Link 17	West of Lough Ramor/Virginia. Commences with Option 10 Yellow, deviating at Edenburt to cross the Blackwater River, linking to Option 08 Blue at Lisnagon, and then to Option 06 Magenta at Cormaddyduff to the west of Lough Ramor.
Link 18	East of Lough Ramor/Virginia. Commences with Option 03 Cyan, then deviates to the north at Murmod to link to Option 04 Blue, terminating in the same location as Link 15.
Link 19	East of Lough Ramor/Virginia. Commences with Option 03 Cyan, then deviates to Option 02 Purple at Cornashesk and then to Option 01 Red at Virginia. The alignment then crosses the existing N3, terminating at Lisgrea in the same location as Option 06 Magenta.

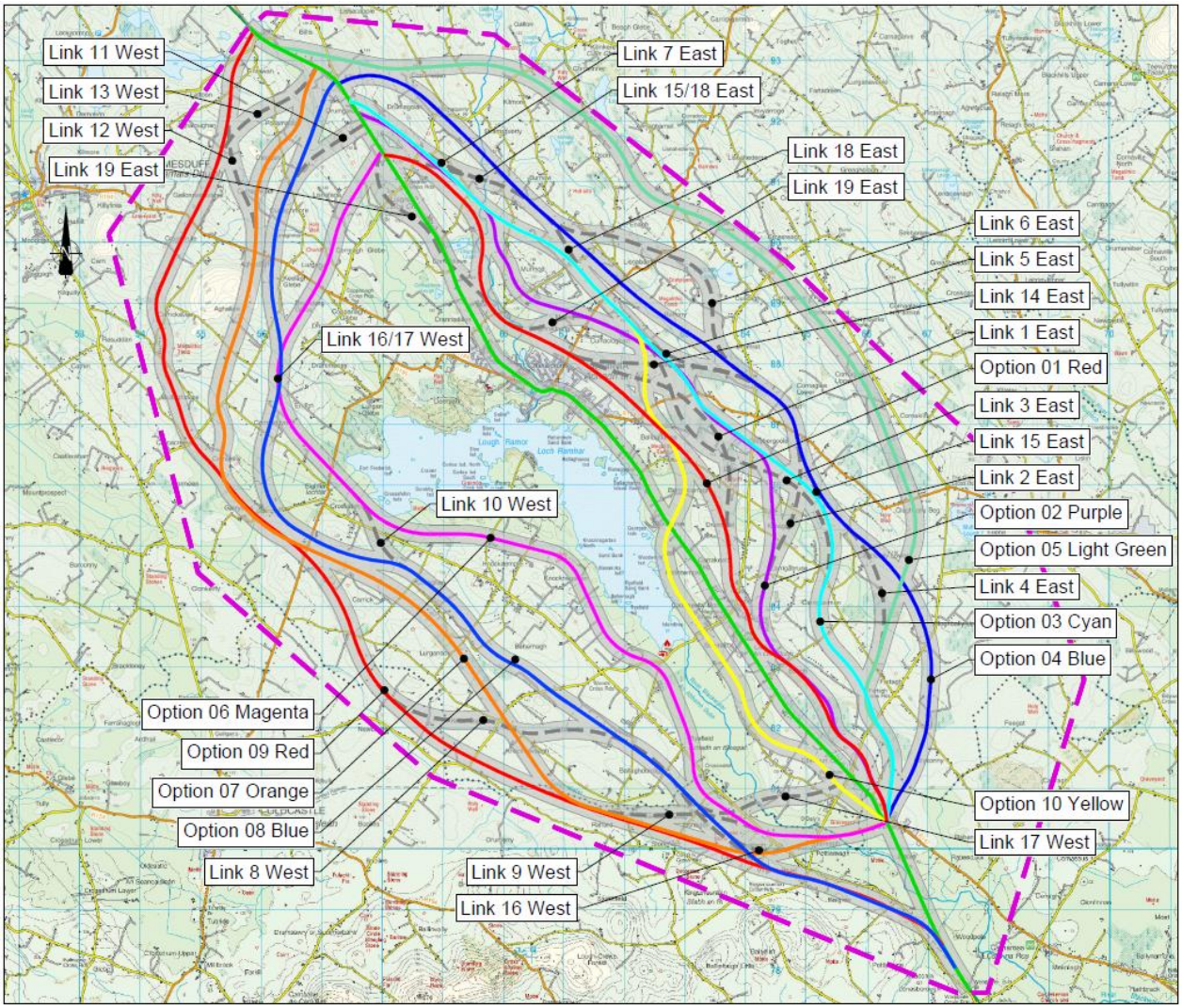


Figure 8-1 Stage 1 Options & Links

The cross-section initially proposed for all options includes a pedestrian / cycle track within the corridor which will be separated by a verge from the road traffic lanes. The benefits of such an arrangement are not quantifiable and were therefore not considered as part of the comparative assessment in Stage 1. However, the construction element and costs were included as part of the engineering and economic assessment below.

8.2 Engineering Assessment

For the engineering assessment, the impacts of the 29 end to end options were quantitatively assessed. The preferences for each sub-criteria were assessed by banding the values in terms of lower, medium and high percentiles. The sub-criteria and performance bands are listed in Sections 8.2.1 to 8.2.11 below. The allocation of performance scores for each individual sub-criteria is presented in Section 8.2.12.

8.2.1 Mainline Road Length (km)

- Low (Green) → < 16.5km
- Medium (Orange) → 16.5 – 19.2km
- High (Red) → > 19.2km

8.2.2 No. of road crossings

- Low (Green) → < 12

- Medium (Orange) → 12 – 15
- High (Red) → > 15

8.2.3 Number of National/Regional roads accessed from junctions on proposed road

At this preliminary stage, a junction strategy had not been undertaken, however an assumption was made for preliminary option comparison that all options crossing the national and regional roads will provide a junction at each. Where options do not pass close to or cross the existing N3 then there may only be junctions provided on the regional roads. Some eastern options include a link to the R194 Virginia – Ballyjamesduff regional road, which also crosses the existing N3 route.

8.2.4 Length of Link Roads (km)

- Low (Green) → <1km
- Medium (Orange) → 1 – 2km
- High (Red) → >2km

8.2.5 Length of Side Roads (km)

- Low (Green) → < 5.4km
- Medium (Orange) → 5.4 – 6.6km
- High (Red) → >6.6km

8.2.6 No. of strategic services crossed

Within the Study Area there is a Gas Transmission main to the east side of Virginia and 38kV high voltage (HV) electricity mains that have been identified as strategic services.

- Low (Green) → <3
- Medium (Orange) → 3-6
- High (Red) → >6

8.2.7 Large river crossings

- Low (Green) → 0
- Medium (Orange) → 1 or 2
- High (Red) → 3 or more

8.2.8 Other watercourse crossings

Assessment was made both qualitatively and quantitatively. Low impact is assessed as fewer than 0.5 watercourse crossings per km approximately. Medium assessed between 0.5 and 1 watercourse crossings per km. High assessed as more than 1 watercourse crossings per km.

- Low (Green) → 1-10
- Medium (Orange) → 11-20
- High (Red) → >20

8.2.9 Safety (traffic transferred from local road network to new road)

As it is envisaged that all options will result in transfer of traffic from the existing network to the new road, all options are deemed to have a positive effect in terms of safety. The degree of traffic transfer will be established once the traffic model has been developed.

8.2.10 Earthworks Balance

The preliminary earthworks balance has been based on the estimate of the difference between cut and fill earthwork quantities. No allowance has been made at this preliminary stage for the suitability and reusability of material.

- Low (Green) → < ±250,000 m^3
- Medium (Orange) → ±250,000 to ±1,000,000 m^3
- High (Red) → > ±1,000,000 m^3

8.2.11 Alignment Constraint (Ac)

Alignment constraint is a measure of the 'bendiness' of an alignment, based on the angle the alignment turns through per kilometre. The higher the alignment constraint value, the more bendy the alignment is.

- Low (Green) → - <8.7
- Medium (Orange) → 8.7 – 9.3
- High (Red) → >9.3

8.2.12 Summary

The matrix presents the detailed assessment under each criterion. A scoring rating of 1, 2 or 3 was assigned to each sub-criteria depending if it was red, orange or green respectively. A performance score was then calculated based on average sub-criteria rating for each of the 29 end to end options. A summary of each option and their performance score is presented in Table 8-2. The numbers shown in the table are the quantitative figures for each sub criterion. The scoring for each is represented by the cell colour and is determined by the ranges set out in the parameter columns. The overall performance score is then calculated by averaging the score of the 11 sub criterion. The Stage 1 Assessment Matrix is included in full in Volume 4 of the Option Selection Report.

Table 8-2 Stage 1 Engineering Assessment Matrix

	Option Reference	Parameters			Op 1 Red East	Op 2 Purple East	Op 3 Cyan East	Op 4 Blue East	Op 5 Light Green East	Op 6 Magenta West	Op 7 Orange West	Op 8 Blue West	Op 9 Red West	Op 10 Yellow East	Lk 1 East – Op 01-01	Lk 2 East – Op 02-04	Lk 3 East – Op 03-03	Lk 4 East – Op 05-04	Lk 5 East – Op 04-03
	Segments	GREEN	AMBER	RED															
Engineering	Mainline Road Length	<16.5km	16.5 - 19.2km	>19.2km	14.6	15.9	15.9	17.1	19.5	18.2	20.6	21.2	22.8	16.0	15.1	17.1	16.0	16.8	16.7
	Number of road crossings	<12	12 - 15	>15	10	13	11	9	13	13	17	17	19	14	10	12	12	9	11
	Number of National/Regional roads accessed				4	2	2	2	2	2	2	2	2	2	4	2	2	2	2
	Length of link roads	<1km	1 - 2km	<2km	3.2	0.9	0.9	0.3	0.5	0.0	0.0	0.3	0.3	0.9	3.6	0.3	1.3	0.3	0.4
	Length of mainline interchange link roads				1.35	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.35	0.9	0.9	0.9	0.9
	Length of Side Roads	<5.4km	5.4 - 6.6km	>6.6km	4.3	5.0	5.3	5.1	5.6	4.8	6.1	7.1	8.5	7.7	3.6	5.3	6.1	4.5	6.4
	No. of road closures				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Number of strategic services crossed	<3	3 - 6	>6	7	5	3	3	4	1	1	1	2	3	7	3	3	3	3
	Major River Crossings	0	1 - 2	>3	3	1	1	1	1	1	1	2	0	1	3	1	1	1	1
	Other Watercourse Crossings	<10	11 - 20	>20	5	8	9	7	6	13	11	11	10	7	6	6	9	8	10
	Road Safety Assessment (benefit to road safety for whole network)																		
	Earthworks - Cut / Fill balance	<±250,000m^3	±250,000m3 - ±1,000,000m3	>±1,000,000m^3	-683,195	-108,044	576,374	618,645	647,195	405,495	3,767,614	1,344,245	1,673,102	129,564	-688,493	176,579	530,227	370,388	607,820
	Cut Volume																		
	Fill Volume																		
	Alignment Constraints, Ac = 6.6+B/10	<8.7	8.7 - 9.3	>9.3	10.312	10.236	9.050	8.345	8.435	9.126	8.703	8.529	8.357	9.534	10.601	9.215	9.288	8.815	8.721
	Green				6	6	6	6	4	4	3	4	6	5	6	5	3	5	4
	Orange				1	4	5	5	6	7	5	3	1	4	1	6	8	6	7
	Red				4	1	0	0	1	0	3	4	4	2	4	0	0	0	0
	Average score				2.182	2.455	2.545	2.545	2.273	2.364	2.000	2.000	2.182	2.273	2.182	2.455	2.273	2.455	2.364

	Option Reference	Parameters			Lk 6 East – Op 04-04	Lk 7 East – Op 04-03	Lk 8 West – Op 08-09	Lk 9 West – Op 06-09	Lk 10 West – Op 08-06	Lk 11 West – Op 08-End	Lk 12 West – Op 07-09	Lk 13 West – Op 09-End	Lk 14 East – Op 04-01	Lk 15 East - Op 03-End	Lk 16 West - Op 07-06	Lk 17 West - Op 08-06	Lk 18 East - Op 03-Lk 15	Lk 19 East - Op 03-End
	Segments	GREEN	AMBER	RED														
Engineering	Mainline Road Length	<16.5km	16.5 - 19.2km	>19.2km	17.6	16.6	23.5	21.4	19.5	20.9	21.0	22.8	16.5	15.3	18.5	18.9	15.1	15.7
	Number of road crossings	<12	12 - 15	>15	11	10	20	18	15	17	18	18	9	10	14	14	10	9
	Number of National/Regional roads accessed				2	2	2	2	2	2	2	2	4	2	2	2	2	4
	Length of link roads	<1km	1 - 2km	<2km	0.3	0.4	0.3	0.0	0.3	0.3	0.0	0.3	2.1	0.5	0.0	1.2	0.9	1.9
	Length of mainline interchange link roads				0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.35	0.9	0.9	0.9	0.9	1.35
	Length of Side Roads	<5.4km	5.4 - 6.6km	>6.6km	6.4	5.8	10.2	7.5	6.6	7.2	6.5	7.9	4.7	4.8	6.5	6.0	4.4	3.3
	No. of road closures				0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Number of strategic services crossed	<3	3 - 6	>6	3	3	2	2	1	1	2	1	5	3	1	1	3	5
	Major River Crossings	0	1 - 2	>3	1	1	1	1	1	2	1	0	3	1	2	2	1	1
	Other Watercourse Crossings	<10	11 - 20	>20	7	9	8	10	10	9	10	9	6	6	12	12	5	9
	Road Safety Assessment (benefit to road safety for whole network)																	
	Earthworks - Cut / Fill balance	<±250,000m^3	±250,000m3 - ±1,000,000m3	>±1,000,000m^3	683,773	506,098	1,900,242	1,447,056	1,065,968	1,170,976	2,799,584	1,547,093	295,239	506,730	777,215	827,802	729,239	65,303
	Cut Volume																	
	Fill Volume																	
	Alignment Constraints, Ac = 6.6+B/10	<8.7	8.7 - 9.3	>9.3	9.146	8.417	9.155	8.632	8.526	8.564	8.524	8.570	9.229	8.772	8.740	9.055	9.060	10.344
	Green				4	5	4	5	5	5	5	6	6	6	3	2	6	7
	Orange				7	6	3	2	4	2	3	1	3	5	8	9	5	3
	Red				0	0	4	4	2	4	3	4	2	0	0	0	0	1
	Average score				2.364	2.455	2.000	2.091	2.273	2.091	2.182	2.182	2.364	2.545	2.273	2.182	2.545	2.545

8.3 Environment Assessment

Similar to the engineering assessment, the impacts of all 29 Options were comparatively assessed either qualitatively or quantitively using the environment sub-criteria and sub-criterion elements, listed in Sections 8.3.1 to 8.3.10 below.

Environmental Impact Assessment is a process that includes information gathered throughout all planning and design phases of the project. The assessment of alternatives (Phase 2) is a key part of Environmental Impact Assessment. While an Environmental Impact Assessment Report may be prepared at Phase 3 (Design and Environmental Evaluation) of the project for the Preferred Option and is not required at this stage of the process, the Option Selection Report and all associated information gathered during Phase 1 and 2 of the Scheme may contribute to it and the environmental topics considered at this stage are based on the topics that may be considered in an Environmental Impact Assessment.

TII have identified a number of environmental sub criteria to be assessed as part of the Phase 2 Stage 1 assessment within the PAG Unit 7.0 Guidelines. TII have also published specific guidelines for a number of these environmental sub criteria, detailing guidelines for assessment at various stages of national road schemes. Where available, these guidelines were used in addition to EIA guidelines and principles to ensure consistency throughout the various stages as far as reasonably practical. In the absence of TII guidelines for a specific sub criteria EIA guidelines and principles were used.

The EIA Directive as transposed into Irish law, outlines factors for inclusion in an Environmental Impact Assessment Report (which may be completed at Phase 3). These factors have been elaborated on by TII and EPA guidelines and professional judgement plays a role. In assessing a road scheme, the following are taken into account:

- National Legislation – The European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019 (SI 279/2019)[11];
- National Guidelines – EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports Draft August 2017;
- National Transportation Guidelines – TII Publications PE-PAG-02031 Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (October 2016); and
- National Transportation Planning and Construction Guidelines for Transportation Projects – TII guidelines on environmental topics.

Table 8-3 clarifies how the Stage 1 Option Selection environmental criteria identified in Unit 7.0 of the TII PAG have been structured throughout this section of the report to allow consistency with the EIA Directive and national EIA legislation at Phase 3. It should be noted that additional topics will be assessed at Phase 3 in the Environmental Impact Assessment Report, as required by the EIA Directive. These include major accidents and disasters, and interactions (including cumulative assessment).

[11] The EIA Directive was transposed into Irish legislation. The 2019 Regulations have amended the 1993 Roads Act and will be the legislative basis of the assessment.

Table 8-3 Stage 1 Environmental Assessment Sub-Criteria

National Legislation (Regulations 2019) and National Guidelines (EPA 2017)	National Transportation Guidelines (Table 7.1.2, TII 2016 PE-PAG-02031)	Stage 1 Environmental Assessment Sub-Criteria
Population and Human Health	Human Beings including compatibility with development policy, Air Quality, Noise, Landscape and Visual, Material Assets, Agriculture	**Section 8.3.1** Air Quality and Climate **Section 8.3.2** Noise and Vibration **Section 8.3.3** Landscape and Visual **Section 8.3.5** Planning and Development **Section 8.3.8** Residential/ Private Properties **Section 8.3.9** Community Impacts **Section 8.3.10** Agriculture
Biodiversity	Flora and Fauna, Water Quality	**Section 8.3.4** Ecology
Land	Geology and Hydrogeology, Agriculture	**Section 8.3.6** Geology **Section 8.3.10** Agriculture
Soil	Geology and Hydrogeology, Agriculture	**Section 8.3.6** Geology **Section 8.3.10** Agriculture
Water	Water Quality, Geology and Hydrogeology	**Section 8.3.4** Ecology **Section 8.3.6** Geology
Air*	Air Quality	**Section 8.3.1** Air Quality and Climate **Section 8.3.2** Noise and Vibration
Climate	Air Quality	**Section 8.3.1** Air Quality and Climate
Material Assets	Material Assets	**Section 8.3.8** Residential/ Private Properties **Section 8.3.9** Community Impacts **Section 8.3.10** Agriculture
Cultural Heritage	Archaeology and Cultural Heritage	**Section 8.3.7** Archaeological, Architectural and Cultural Heritage
Landscape	Landscape and Visual	**Section 8.3.3** Landscape and Visual

*Noise is not specifically identified in the EIA Directive or national legalisation but as noise is transmitted through air, it is taken to be included here.

The methodology and results for each environmental sub-criteria are presented in sections below. The detailed assessment matrix for Stage 1 Assessment is presented in Volume 4 Part B of OSR.

8.3.1 Air Quality and Climate

AONA Environmental Consulting were commissioned to conduct the Air Quality and Climate assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

Two no. sub-criterion elements were selected for Air Quality and Climate assessment. The methodology for these elements is outlined below.

The TII Guidelines on the Treatment of Air Quality during the Planning and Construction of National Road Schemes (May 2011) were referred to in completing the air quality and climate assessment.

For Stage 1 Preliminary Options Assessment, the existing local air quality conditions in relation to nitrogen dioxide and Particulate Matter (PM10) was considered including any non-road sources that may significantly affect air quality. Previous air quality studies and granted planning permissions within the study area were also considered.

For the purpose of the preliminary assessment of route corridors, comparison of the proposed routes with the existing N3 alignment has not been considered. Each proposed route corridor has been considered as a proposed new road which will have a potentially negative impact on air quality at receptors within 50m of its proposed alignment and at designated sites within 200m of the alignment. In reality, all proposed route corridors will impact a lower number of sensitive receptors when compared to the existing N3 alignment and therefore, all route options are preferable from an air quality perspective.

- Air Quality and Climate Sub-Criterion Element 1: Sensitive Receptors

Sensitive receptors within 50m of the carriageway of each option were identified and recorded. This is a quantitative assessment. The number of receptors sensitive to air quality within 50m of each of the proposed route corridors was determined based on the GeoDirectory dataset. Receptors for the purpose of this preliminary assessment are regarded as any buildings with the exception of non-residential farm buildings and buildings known to be solely for commercial use.

- Air Quality and Climate Sub-Criterion Element 2: Nitrogen sensitive habitats

The potential impact of the proposed route corridors on ambient NOx concentrations at sensitive ecosystems (European designated sites) within 200m of the route centrelines has also been considered when comparing the routes from an air quality perspective. This is a quantitative and qualitative assessment and statement.

Results

There is a limited differentiation between route options from an Air Quality & Climate perspective. All options are anticipated to generate Minor or Slightly Negative impacts.

There is no significant differentiation amongst the route options with regard to the impact on air sensitive receptors within 50m of each route as all route options are predicted to impact a relatively low number of air sensitive receptors.

The designated Nitrogen Sensitive Habitats within the study are and in proximity to the proposed alternative alignments include Killyconny Bog SAC and River Boyne SAC. There are designated Nitrogen Sensitive Habitats within 200m of the centreline of some of the route options. In such cases, these route option alignments have been deemed to be less preferred.

The preferred route option alignments are those which are not within 200m of designated Nitrogen Sensitive Habitats and have relatively few air sensitive receptors within 50m of each route option.

Options 1, 3, 5 and Links 1, 2, 3, 4, 15, 18, 19 are not within 200m any SAC and have comparatively fewer dwellings within 50m of centreline (5 dwellings or less), hence ‘High Preference’. Option 2 is also not within 200m of any SAC but has 9 dwellings within 50m of centreline, hence ‘Medium Preference’. All other options are assigned ‘Low Preference’ despite fewer number of dwellings within 50m of centreline because all these options are within 200m of Killyconny Bog or River Boyne SAC.

Table 8-4 Stage 1 Air Quality and Climate Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.2 Noise and Vibration

AONA Environmental Consulting were commissioned to conduct the Noise and Vibration assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

One no. sub-criterion element was selected were selected for Noise and Vibration assessment.

The TII Guidelines for the Treatment of Noise and Vibration in National Road Schemes, 25th October 2004 and the Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes March 2014 should be referred to in completing the noise assessment.

For Stage 1 Preliminary Options Assessment, any receptors deemed to be particularly sensitive to noise and/or vibration should be identified along with characteristics of the prevailing noise climate and opportunities for noise mitigation e.g. as a result of favourable topography. This is a quantitative assessment and statement based on the GeoDirectory dataset.

- Noise and Vibration Sub-Criterion Element 1: Sensitive receptors

The location of dwellings was determined based on the GeoDirectory dataset. The number of dwellings were counted within 0 - 50m, 50 – 100m and 100 – 200m of the centreline of each route corridor.

Results

There is a limited differentiation between route options from a noise perspective. All options are anticipated to generate negative noise impacts which can be attenuated with suitable noise mitigation measures at detailed design stage. More detailed noise assessment will be required at later phases of the scheme design to determine the precise noise impacts and the need for mitigation.

The 29 route options assessed have varying numbers of residential properties in proximity to the proposed route option alignments within 0 - 50m, 50 – 100m, 100 – 200m and 200 – 300m of the centreline of each route option alignment. All route option alignments have been assessed to potentially result in negative noise impacts.

Route options with no residential properties within 0 - 50m of the proposed route option alignments have been preferred as these route options are less likely to exceed the TII design guideline of 60 dB(A) L_{den} and/or require the need for mitigation. These are Links 3, 15, 16 and 17.

Route options with a high number of noise sensitive properties within 0 - 50m and within 300m of centreline and hence a high Potential Impact Rating (PIR) have been deemed to be least preferred. These are Option 1 (PIR 544) and Links 1 (PIR 438) and 9 (PIR 198). Link 9 has a comparatively lower PIR but has the highest number of dwellings with 50m of the centreline along with Link 1 and hence, ranked as least preferred.

Table 8-5 Stage 1 Noise and Vibration Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.3 Landscape and Visual

JBA Consulting were commissioned to conduct the Landscape and Visual Impact assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

The LVIA methodology used is generally in line with TII Publication PE-ENV-01101 Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document. (Dec 2020).

This document promotes use of the existing Landscape Character Assessment (LCA) from the county development plan as the baseline landscape condition and recommends checking for consistency between county boundaries where a study area extends across 2 or more counties.

The scoping system for the Preliminary Assessment of Options is generally in line with TII Publication PE-ENV-01102 Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads – Standard (Dec 2020).

The project thresholds look to establish High, Medium or Low preferences of route options and within a score range of 1-3 i.e. 1=High preference and 3=Low preference.

- High Preference option(s) will have the lowest number of significant impacts on valued landscape character areas, designated landscapes or amenity features and least impact on the visual receptors or scenic routes/viewpoints. The likely impact will be a minor negative impact with a low score i.e. **score of 1** (in line with the quantitative assessment methodology chosen for the options).
- Medium Preference option(s) will have a moderate number of significant impacts on valued landscape character areas, designated landscapes or amenity features and moderate impacts on visual receptors or scenic routes/viewpoints. The likely impact will be a moderately negative impact with a medium score i.e. **score of 2** (in line with the quantitative assessment methodology chosen for the options).
- Low Preference option(s) will have the greatest number of significant impacts on valued landscape character areas, designated landscapes or amenity features and greatest impact on visual receptors or scenic routes/viewpoints. The likely impact will be a major negative impact with a high score i.e. **score of 3** (in line with the quantitative assessment methodology chosen for the options).

Results

Option 3, 4, 5, 8, 9 and Links 2, 3, 4, 5, 7, 8, 11, 13, 15, 18 were assigned ‘High Preference’ and Options 1, 6, 10 and Links 1, 9, 10, 14 were assigned ‘Low Preference’. All other options were assigned ‘Medium Preference’.

Table 8-6 Stage 1 Landscape and Visual Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.4 Ecology

EirEco Environmental Consultants were commissioned to conduct the Ecology assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

The ecological assessment was undertaken with regards to NRA (now TII) Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009).

A broad assessment was undertaken of the likely impacts of each of the corridor options on the key ecological receptors identified on or within the zone of influence, with an indication as to which, if any, of these are likely to be significant, and at what geographical level. The key ecological receptors were identified at the constraints stage and include designated conservation areas, identified sites of biodiversity value from national databases (native woodlands, known bat roosts, important bird areas, etc.), sites identified from a review of aerial imagery, and water course crossings.

Site surveys were undertaken using a combination of windscreen surveys and roadside views where possible. Following the desk-based review of available information on the habitats and species of conservation value found within the Study Area, a series of site visits were undertaken. The aim of these site visits was to view the ecological features of interest first hand, determine the likely interaction that each route may have on these habitats and to undertake a preliminary assessment of the potential impact each route may have on the identified habitats. Restricted field surveys were undertaken at key sites, features and route sections that were deemed to be of particular ecological value with the aim to assess the potential impacts of the routes upon them. Crossing points and points of interaction were visited for each of the routes and, where feasible, 'vantage point' surveys were undertaken in the form of visual inspections from strategic locations. Access to locations and habitats within the Study Area was restricted as permission to cross private and farmed lands had yet to be formalised.

Sites were evaluated and the scale of impact determined based on the criteria presented in Table 8-7. The designated conservation areas and sites of ecological interest crossed by Stage 1 Options are listed in Table 8-8 and Table 8-9.

Table 8-7 Ecological Valuation Criteria (adapted from NRA 2009)

Importance	Ecological Valuation
International Importance A	• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Features essential to maintaining the coherence of the Natura 2000 Network. • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.

	• Resident or regularly occurring populations (assessed to be important at the national level) of species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988). • Major salmon river fisheries.
National Importance B	• Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts 1976 to 2012. • National Park. • Resident or regularly occurring populations (assessed to be important at the national level) of species protected under the Wildlife Acts 1976 to 2012; and/or; species listed on the relevant Red Data list. • Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive. • Major trout river fisheries. • Commercially important coarse fisheries. • Waterbodies with high amenity value.

County Importance C	• Area of Special Amenity.
	• Area of High Amenity, or equivalent, designated under a County Development Plan.
	• Resident or regularly occurring populations (assessed to be important at the County level) of:
	  ○ species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  ○ species protected under the Wildlife Acts 1976 to 2012; and/or,
	  ○ species listed on the relevant Red Data list.
	• Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.

Local Importance (Higher Value) D	• Locally important populations of priority species or habitats or natural heritage features identified in the Local Biodiversity Action Plan (BAP), if this has been prepared;
	• Resident or regularly occurring populations (assessed to be important at the Local level) of:
	  ○ species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
	  ○ species protected under the Wildlife Acts 1976 to 2012; and/or,
	  ○ species listed on the relevant Red Data list.
	• Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
	• Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
	• Sites of 'High' water quality status (Q4-5, Q5).
	• Waterbodies with some fisheries value and potential salmonid habitat.

Local Importance (Lower Value)	• Sites containing small areas of semi-natural habitat that are of some local importance for wildlife.

E	• Sites or features containing non-native species that are of some importance in maintaining habitat links. • Waterbodies with no fisheries value and poor fisheries habitat.

Table 8-8 Designated Conservation Areas Impacted by Stage 1 Options

Site No.	Site Name	Description	Evaluation (As per Table 8-7)	Options Crossing Designated Sites
002299	River Boyne & River Blackwater SAC	River channel only.	A	Options 6, 7 and Links 9, 12, 16, 17
004232	River Boyne & River Blackwater SPA	Includes some adjacent floodplain.	A	Options 6, 7 and Links 9, 12, 16, 17
000008	Lough Ramor pNHA	Includes entire lake and extensive areas of adjacent woodland and grassland.	B	Options 6, 7, 10 and Link 10

Table 8-9 Ecological Sites Impacted by Stage 1 Options

Site No.	Site Name	Description	Evaluation (As per Table 8-7)	Options Crossing Ecological Sites
2	Carn, Kildorough	Heath and gorse scrub on elevated land.	D	Option 7 and Link 12
3	Pollamalady, Correagh	Deciduous woodland, scrub and grassland with network of well-developed hedgerows and treelines. Outlier of wet woodland / marsh in north-west (Irish Wetlands WMI_CN482)	D	Options 7, 9 and Links 8, 9, 12, 13
5	Corraneden, Drumagolan	Deciduous woodland. (Irish Wetlands WMI_CN486)	D	Option 5
6	Drumagolan, Correagh	Deciduous woodland (possibly on peat).	D/C	Options 2, 3, 10 and Links 3, 5, 7
7	Kilmore / Lissannymore Stramaquerty	Callow floodplains on R. Blackwater. (Irish Wetlands WMI_CN484)	D/C	Option 5
8	Corratinner, Beagh and Kilmore Lough	Raised bog with fringing deciduous woodland (Irish Wetlands WMI_CN583), extending to south towards Kilmore Lough (Irish Wetlands WMI_CN563). Doon wet woodland in south (Irish Wetlands WMI_CN564)	C	Option 5
10	Cornaslieve Lough, Crannadillon	Woodland plantation around lake. (Irish Wetlands WMI_CN302)	C	Option 1 and Links 1, 14, 19
12	Lisnabantry Bog	Cutover raised bog with fringing woodland and scrub. (Irish Wetlands WMI_CN78)	C	Options 3, 4, 10 and Links 2, 3, 4, 5, 7, 15, 18
13	Lisnabantry	Relict raised bog with woodland and scrub fringe.	D/C	Link 6

Site No.	Site Name	Description	Evaluation (As per Table 8-7)	Options Crossing Ecological Sites
16	Crossbeagh, Mullagh	Mixed woodland, scrub and grassland mosaic. (Irish Wetlands WMI_CN296)	D	Option 5
17	Corragloon, Fort William	Relict raised bog with woodland and scrub fringe. (Irish Wetlands WMI_CN295)	D/C	Option 5
18	Drumrat / Corfad Bog	Intact raised bog with fringing woodland on east side. (Irish Wetlands WMI_CN298)	B	Option 4 and Links 2, 4, 7, 15
19	Cloghergoole, Lislea Bog	Raised bog partially cutover in two blocks with surrounding conifer plantation. (Irish Wetlands WMI_CN289)	D/C	Options 2, 3 and Links 1, 3, 18, 19
21	Cornaglea Upper	Deciduous woodland (possibly on bog).	D/C	Option 5
25	Fartagh	Wet grassland (possibly bog) with scrub mosaic.	D	Options 3, 5 and Links 3, 4, 15, 18, 19
26	Enagh Bog	Relict raised bog with extensive woodland. (Irish Wetlands WMI_CN283)	D/C	Options 1, 2 and Links 1, 2
27	Edenburt	Pond / flooded area in grassland – possibly wet.	D	Options 1, 2 and Links 1, 2
31	Kilnagun	Relict raised bog with extensive woodland / scrub. (Irish Wetlands WMI_CN288)	D/C	Option 2 and Link 2
32	Burrencarragh	Deciduous woodland.	D/C	Options 1, 10 and Link 1
33	Cornashesk	Mixed woodland / heath mosaic – possibly on peat.	D	Option 10
34	Curracloghan Bog	Relict raised bog with extensive woodland / scrub. (Irish Wetlands WMI_CN299)	D/C	Option 1 and Links 1, 14
35	Pottlereagh	Flood area with surrounding scrub and wet grassland mosaic – partially within SPA but may be quarried.	D(A)	Option 6 and Link 9
36	Ballaghdorragh, Moate	River valley with woodland and scrub.	D	Options 6, 8 and Links 8, 10, 11, 16, 17
38	Pottlereagh	Blocks of deciduous woodland and adjoining old railway line.	D	Option 6 and Link 9
39	Ballaghdorragh	Network of mature treelines and hedgerows.	D	Option 8 and Links 8, 10, 11, 16, 17
40	Behernagh Bog	Relict raised bog with extensive woodland / scrub. (Wetlands Ireland WMI_CN282)	D/C	Option 7 and Link 12
41	Lurganboy	Relict raised bog with extensive woodland / scrub.	D/C	Option 7 and Link 12
42	Newcastle	Relict raised bog with some scrub.	D/C	
43	Carrick	Deciduous woodland with grassland / scrub mosaic.	D	Option 9 and Links 8, 9, 13

Site No.	Site Name	Description	Evaluation (As per Table 8-7)	Options Crossing Ecological Sites
44	Mullaghmore, Kildorough	Two blocks of wetland (possible fen) with extensive woodland and scrub development. (Irish Wetlands WMI_CN306 / WMI_CN307)	D/C	Option 7 and Link 12

The number of significant impacts at each geographic level associated with the various corridor options were presented, characterized and compared in a tabulated format. The levels of impact assigned to particular corridor options make the assumption that general mitigation measures will be implemented. The options were then assigned an overall ranking (high, medium or low preference) based on the number and significance of ecological receptors impacted by each corridor option.

Results

The options with impacts on designated conservation areas and sites of ecological interest are listed in Table 8-8 and

Table 8-9 above. Based on these impacts, option preferences were assigned as detailed below.

Options 6 & 7 and Links 9, 12, 16 & 17 were assigned 'Low Preference' as they cross River Boyne and River Blackwater SAC and SPA. Option 6 also impacts on margins of Lough Ramor pNHA.

Options and links with impact on relatively high number of ecological sites, longer length of road within mature woodland and number of water crossings were assigned 'Medium Preference'. These are Options 1, 2, 3, 5, 8 & 10 and Links 1, 2, 3, 7, 8 and 10. The sites impacted by these options and links, and their ecological evaluation, is presented in Table 8-8 and

Table 8-9 above. Link 10 is assigned 'Medium Preference' despite only impacting two ecological sites because of possible impacts on Lough Ramor pNHA.

All other options were assigned 'High Preference'. None of these options impact on SAC, SPA or pNHA.

Table 8-10 Stage 1 Ecology Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.5 Planning and Development

Barry Transportation conducted the Planning assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

The Cavan County Development Plan 2014 – 2020 identifies zoned lands in Virginia Town. The map includes the proposed bypass route as protected from development since it received Part 8 Planning in 2003. None of the options are within zoned land so all are assigned 'High Preference' (Green).

Table 8-11 Stage 1 Planning and Development Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.6 Geology

Barry Transportation conducted the Geology assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

An assessment was made of option lengths over peat. This was done by overlaying the option alignments on soils database as obtained from Geological Survey of Ireland's website. The following thresholds were used to assign preferences to options and links.

- Low (Green) → <2km
- Medium (Orange) → 2-4km
- High (Red) → >4km

Results

Based on the length of options over peat soils, Options 6, 7, 8, 9 and Links 8, 9, 10, 11, 12, 13, 16, 17 were assigned 'High Preference'; Options 1, 10 and Link 6 were assigned 'Medium Preference' and rest were assigned 'Low Preference'.

Table 8-12 Stage 1 Geology Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.7 Archaeological, Architectural and Cultural Heritage

John Cronin and Associates were commissioned to conduct the Archaeological, Architectural and Cultural Heritage assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

Two criteria were used to assess the archaeological, architectural and cultural heritage impacts, as listed below.

- Total impacts directly within alignment footprint (including Zones of Archaeological Sites and Designed Landscapes); and

- Total impacts directly within 300m design corridor (including Zones of Archaeological Sites and Designed Landscapes).

Results

Option 3 and Links 6, 16, 17, 18, 19 were assigned 'High Preference' as they do not have any direct impacts on heritage sites within alignment footprint and have comparatively lower impacts within 300m design corridor.

Options 1, 4, 5 and Links 1, 2, 3, 4, 7, 9, 13, 14, 15 are assigned 'Low Preference' as they have at least one direct impact within alignment footprint and comparatively higher number of direct impacts within 300m corridor. Option 9 and Link 8 have no direct impact within alignment footprint but have one of the highest direct impacts within 300m corridor and hence assigned 'Low Preference'.

All other options are assigned 'Medium Preference'.

Table 8-13 Stage 1 Archaeological, Architectural and Cultural Heritage Assessment Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.8 Residential/ Private Properties

Barry Transportation conducted the Residential and Private Properties assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements & Methodology

Residential properties were identified using the 2019 Geodirectory database and further investigation into planning permissions granted for dwellings within the last 5 years that have been recently constructed or were under construction in early 2020. This data was used to calculate the number of residential properties impacted by each corridor option.

The impacts were classified as direct hits to residential properties and impacts on residential gardens. All options and links with no direct hits to residential properties were assigned 'High Preference', with direct hits to 1 – 3 residential properties were assigned 'Medium Preference' and with direct hits to more than 3 residential properties were assigned 'Low Preference'. These thresholds for direct hits to residential properties are listed below.

- High (Green) → < 1
- Medium (Orange) → 1 – 3
- Low (Red) → > 3

All options and links with no impact on a residential garden were assigned 'High Preference', with impacts on 1 to 3 residential gardens were assigned 'Medium Preference' and with impacts on more than 3 residential gardens were assigned 'Low Preference'. These thresholds for impacts on residential gardens are listed below.

- High (Green) → < 1

- Medium (Orange) → 1 - 3
- Low (Red) → > 3

Results

The preference of options for impacts on residential properties are shown in tables below.

Table 8-14 Stage 1 Residential/Private Property – Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Table 8-15 Stage 1 Residential Garden Impact – Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.9 Community Impacts

Barry Transportation conducted the Community Impacts assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements & Methodology

Community facilities such as schools, childcare centres, sports grounds and burial grounds, were identified during the Constraints Study. None of the options impact directly on community facilities. However, there were some community facilities identified as being within 300m of the option centrelines. These thresholds for impacts on community facilities are listed below.

- Low (Green) → 0
- High (Red) → >/= 1

Results

The option preferences for community impacts are shown below.

Table 8-16 Stage 1 Community Impact – Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.10 Agriculture

John Bligh and Associates were commissioned to conduct the Agriculture assessment for N3 Virginia Bypass Scheme – Preliminary Options Assessment as detailed below.

Sub-Criterion Elements and Methodology

The impact assessment for options comprised of a quantitative and a qualitative assessment of the agricultural lands and property along a 300m wide corridor for each option.

The high-level evaluation of the long list options involved assigning a value rating and an impact rating to each option based on the qualitative and quantitative findings under:

- Length of route option section (km);
- Landcover - length of option on improved grassland(km);
- Impact on farmhouses / farmyards / farm facilities (no. within 300m corridor); and
- Level of impact on sensitive key agricultural constraints (no. and % length of option).

Landcover assessments were evaluated as the level of improved grassland / arable land along the length of the option corridor. The comparative impact on farmhouses, farm buildings and farm facilities such as animal handling pens was based on the numbers of each within the 300m corridor. The key agricultural constraints data was derived from the Agricultural Constraints Report and the inventory of constraints (e.g. dairy, equine, pig, poultry, horticulture and agribusinesses). This information was quantified by number (on a per km basis) for each corridor option. The level of agricultural constraints deemed sensitive to road development was identified by the length of such constraints along option corridor.

The criteria used as a guide to determine the value rating of corridor options are outlined in Table 8-17.

Table 8-17 Corridor Option Value Rating

Value rating	Qualitative Criteria	Quantitative Criteria
High	• Landcover is primarily improved grassland with low levels of forestry, rough grassland / scrub, or peat bog. • Agricultural lands with effective management are suited to intensive agricultural production and a wide range of Agricultural uses. • High level of sensitive and land-based key Agricultural enterprises present, i.e., dairy, equine.	• Length of Improved grassland (top 1/3 of options). • Number of sensitive land-based enterprises (<0.9 No. per km).
Medium	• Landcover is comprised of improved grassland with moderate levels of	• Length of Improved grassland (middle 1/3 of options).

	forestry, rough grassland / scrub, or peat bog. • Agricultural lands are less suited to intensive agricultural production. Lands are generally limited in the range of agricultural uses. • Moderate level of sensitive and land-based key agricultural enterprises present, i.e., dairy, equine.	• Number of sensitive land-based enterprises (0.9-1.1 No. per km).
Low	• Landcover is comprised of a high level of forestry, rough grassland / scrub, or peat bog. • Agricultural lands are limited and are suited to a more extensive level of agricultural production. • Low level of sensitive and land-based key agricultural enterprises present, i.e., dairy, equine.	• Length of Improved grassland (bottom 1/3 of options). • Number of sensitive land-based enterprises (>1.1 No. per km).

The criteria used as a guide to determine the impact rating of corridor options are outlined in Table 8-18.

Table 8-18 Corridor Option Impact Rating

Impact rating	Qualitative Criteria	Quantitative Criteria
High	• High level of improved grassland • High impact on farmhouses and / or farmyards. • High level of key agricultural constraints on improved grassland. • Online section(s) not significant.	• Length of Improved grassland (top 1/3 of options) • Farmhouses > 2 per option. • Farmyards > 3 per option. • Length of Key Constraints on Improved Grassland - >40%
Medium	• Medium level of improved grassland • Medium impact on farmhouses and / or farmyards. • Medium level of key agricultural constraints on improved grassland. • Significant online section(s), where applicable.	• Length of Improved grassland (top 1/3 of options) • Farmhouses 1-2 per option. • Farmyards 1-3 per option. • Length of Key Constraints on Improved Grassland - 25-40%
Low	• Low level of improved grassland. • Low impact on farmhouses and / or farmyards. • Low level of key agricultural constraints on improved grassland. • Significant online section(s), where applicable.	• Length of Improved grassland (top 1/3 of options) • No farmhouses impact. • No farmyards impact. • Length of Key Constraints on Improved Grassland - <25%

The impact category for options was determined from the combination of the value rating combined with the impact rating. There are three categories relevant to the assessment of the impact on agriculture that comprise of 'Minor or slightly negative', 'Moderately negative' and 'Major or highly negative'. These categories were taken from the seven-point scale in TII guidance (TII PAG, 2016). The option impact categories were determined by reference to the matrix in Table 8-19 using the value rating and impact rating.

Table 8-19 Impact category and MCA

Value	Impact		
	High	**Medium**	**Low**
High	Major or highly negative (Score 1)	Moderately negative (Score 2)	Moderately negative (Score 2)
Medium	Moderately negative (Score 2)	Moderately negative (Score 2)	Minor or slightly negative (Score 3)
Low	Minor or slightly negative (Score 3)	Minor or slightly negative (Score 3)	Minor or slightly negative (Score 3)

Results

Option 1, 7 and Links 1, 15, 18, 19 were assigned 'High Preference' due to least level of impacts on agricultural constraints.

Options 2, 3, 4 and Links 2, 3, 4, 6, 7, 12, 14 were assigned 'Medium Preference' due to comparatively high level of impacts on agricultural constraints.

Option 5, 6, 8, 9, 10 and Links 5, 8, 9, 10, 11, 13, 16, 17 were assigned 'Low Preference' due to highest level of impacts on agricultural constraints.

Table 8-20 Stage 1 Agricultural Impact – Summary

Options									
1	2	3	4	5	6	7	8	9	10

Links																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

8.3.11 Summary

For each option the number of greens, oranges and reds for eleven environmental sub-criteria, discussed above, were counted. A scoring rating of 3, 2 and 1 was applied for the high (green), medium (orange) and low (red) preferences, respectively. These counts and ratings were used to calculate the average scores for the environment sub-criteria.

The average environmental scores for each option for environment sub-criteria are shown in Table 8-21 below. The Stage 1 Assessment Matrix is included in full in Volume 4 Part B of the Option Selection Report.

Table 8-21 Stage 1 Environmental Assessment Matrix

	Option Reference	Parameters			Op 1 Red East	Op 2 Purple East	Op 3 Cyan East	Op 4 Blue East	Op 5 Light Green East	Op 6 Magenta West	Op 7 Orange West	Op 8 Blue West	Op 9 Red West	Op 10 Yellow East	Lk 1 East – Op 01-01	Lk 2 East – Op 02-04	Lk 3 East – Op 03-03	Lk 4 East – Op 05-04	Lk 5 East – Op 04-03	Lk 6 East – Op 04-04	Lk 7 East – Op 04-03	Lk 8 West – Op 08-09	Lk 9 West – Op 06-09	Lk 10 West – Op 08-06	Lk 11 West – Op 08-End	Lk 12 West – Op 07-09	Lk 13 West – Op 09-End	Lk 14 East – Op 04-01	Lk 15 East - Op 03-End	Lk 16 West - Op 07-06	Lk 17 West - Op 08-06	Lk 18 East - Op 03-Lk 15	Lk 19 East - Op 03-End
	Segments	GREEN	AMBER	RED																														
Environment	AIR QUALITY & CLIMATE																																	
	Air Quality - Dwellings with 50m of carriageway				4	9	4	3	3	3	4	3	2	5	5	5	3	1	5	3	4	4	5	1	3	2	4	3	0	1	1	1	5
	Air Quality - Schools, Health Centres and the like with 50m of carriageway				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Within 200m of Kilconny Bog SAC?				No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No	Yes	No	No	No	No	No	No
	Within 200m of River Boyne SAC?				No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	No
	NOISE																																	
	Noise Impacts (number of noise sensitive properties within 300m of centreline) - Potential Impact Rating (PIR)				544	263	175	177	214	227	266	181	239	208	438	220	165	167	185	183	188	260	198	230	263	188	222	344	154	190	206	156	193
	Noise Band 1 (0 to 50m), weighting 4				*3*	*3*	*1*	*2*	*1*	*3*	*3*	*3*	*1*	*2*	*4*	*2*	*0*	*1*	*1*	*2*	*2*	*3*	*4*	*1*	*1*	*2*	*2*	*2*	*0*	*0*	*0*	*1*	*3*
	Noise Band 2 (50 to 100m), weighting 3				*19*	*27*	*15*	*11*	*10*	*10*	*26*	*10*	*17*	*21*	*19*	*19*	*13*	*8*	*17*	*11*	*14*	*15*	*12*	*17*	*25*	*13*	*17*	*10*	*7*	*19*	*18*	*6*	*11*
	Noise Band 3 (100 to 200m), weighting 2				*140*	*50*	*37*	*42*	*56*	*60*	*58*	*46*	*57*	*60*	*82*	*42*	*38*	*42*	*41*	*45*	*44*	*60*	*49*	*54*	*61*	*42*	*47*	*68*	*36*	*46*	*53*	*39*	*46*
	Noise Band 4 (200 to 300m), weighting 1				*195*	*70*	*52*	*52*	*68*	*65*	*60*	*47*	*70*	*57*	*201*	*71*	*50*	*55*	*48*	*52*	*50*	*65*	*48*	*67*	*62*	*57*	*69*	*170*	*61*	*41*	*46*	*56*	*56*
	ECOLOGY																																	
	Ecology - length of road within SACs & SPA's				0	0	0	0	0	0.08	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0.08	0	0	0.02	0	0	0	0.02	0.02	0	0
	Ecology - length of road within NHA's & pNHA's				0	0	0	0	0	0.86	0	0	0	0.38	0	0	0	0	0	0	0	0	0	0	0.37	0	0	0	0	0	0	0	0	0
	Ecology - length of road within mature woodland				0.39	0.48	0.53	0.39	0.34	0.11	0.15	0.06	0.05	0.12	0.39	0.63	0.45	0.37	0.19	0	0.37	0.05	0.16	0.06	0.06	0.31	0	0	0.49	0.08	0.17	0.38	0.50
	Ecological sites impacted				10, 26, 27, 32, 1	19, 31, 26, 2	6, 12, 19, 25	12, 18	18, 16, 17, 21	36, 38, 35	3, 2, 44, 41, 4	39, 36	3, 43	6, 12, 33, 32	26, 27, 19, 32	12, 18, 31, 26, 27	6, 12, 19, 25	12, 18, 25	6, 12	13	6, 12, 18	3, 43, 39, 36	3, 43, 38, 35	39, 36	39, 36	3, 2, 44, 41, 40	3, 43	10, 34	12, 18, 25	39, 36	39, 36	12, 19, 25	10, 19, 25
	Comments				Major impact on R. Blackwater. Minor impact site 10. Major impact sites		Mod. Impact site 6. Major impact site 12. Mod impact Site 19. Major	Runs close to Kilconny Bog SAC. Major impact on sites 12 & 18.		Impacts on margins of Lough Ramore NHA and crosses Boyne	Crosses Boyne SAC/SPA			Impacts on L. Ramor NHA	Major impact on R. Blackwater. Minor impact site 10. Major impact sites	Major impact on sites 12, 18, 26 & 27.	Mod. Impact site 6. Major impact sites 12, 19 & 25.	Major impact on site 12 & 18. Mod impact site 25.	Adjacent to Kilconny Bog SAC. Mod. Impact site 6. Major impact site 12.	Adjacent to Kilconny Bog SAC. Mod impact site 13.	Adjacent to Kilconny Bog SAC. Mod impact sites 6 & 12. Major impact site		Crosses Boyne SAC/SPA	Impacts on L. Ramor NHA		Crosses Boyne SAC/SPA		Adjacent to Kilconny Bog SAC. Major impact on R. Blackwater. Minor impact	Major impact on site 12, 18 & 25.	Crosses Boyne SAC/SPA	Crosses Boyne SAC/SPA	Major impact Site 12. Mod impact site 19. Major impact site 25.	Mod impact site 10. Minor impact Site 33. Mod impact site 19. Major
	Major River Crossings				3	1	1	1	1	1	1	2	0	1	3	1	1	1	1	1	1	1	1	1	2	1	0	3	1	2	2	1	1
	Other Watercourse Crossings				5	8	9	7	6	13	11	11	10	7	6	6	9	8	10	7	9	8	10	10	9	10	9	6	6	12	12	5	9
	PLANNING & DEVELOPMENT Length of road within zoned land				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GEOLOGY Length of road over peat or soft ground	<1	1 - 2	>2	3.44	4.42	7.00	5.46	7.2	0.37	0.81	0.27	0.77	2.29	4.12	5.57	6.38	6.42	4.21	3.58	5.4	0.52	0.77	0.62	0.27	0.95	0.69	4.29	7.00	0.4	0.4	0.86	0.15
	LANDSCAPE & VISUAL																																	
	Route option with least impact on valued landscape character/amenity features and vitual receptors or scenic routes/viewpoints. Scoring is as follows: 1-Minor negative impact = High Preference 2-Moderately negative = Medium Preference 3-Major negative = Low Preference				3	2	1	1	1	3	2	1	1	3	3	1	1	1	1	2	1	1	3	3	1	2	1	3	1	2	2	1	2
	ARCHAEOLOGY, ARCHITECTURAL & CULTURAL HERITAGE																																	
	Archaeology, Architectural and Cultural Heritage - total impacts directly within alignment footprint (Incl. ZoNs of archaeological sites & designed landscapes)				2	0	0	2	1	0	0	0	0	1	1	2	1	2	0	0	2	0	2	0	0	0	1	1	2	0	0	0	0
	Archaeology, Architectural and Cultural Heritage - total impacts within 300m design corridor (Incl. ZoNs of archaeological sites & designed landscapes)				8	10	5	4	10	11	6	8	12	8	9	8	7	6	8	4	7	20	15	7	10	7	11	7	5	6	6	1	2
	AGRICULTURE																																	
	Agriculture (Length of option within Agricultural Land)				14.46	15.18	14.64	15.59	18.56	17.29	19.77	20.77	22.34	15.07	14.94	15.51	14.98	15.25	15.81	17.33	15.07	22.86	20.25	19.03	20.48	20.14	22.47	16.24	13.72	17.88	18.19	13.89	14.99
	Agriculture (Length of option within Improved grassland/arable land				12.90	10.18	10.59	12.12	12.68	15.76	17.39	19.55	20.05	12.59	12.74	12.23	10.96	11.18	12.87	13.95	11.96	21.28	18.42	17.99	19.78	17.91	20.33	13.72	9.86	17.00	17.25	9.22	10.97
	Agriculture - farmhouse properties - direct hits				0	0	1	0	2	1.00	1	0	2	2	0	0	0	0	0	0	0	2	2	0	0	1	2	0	0	0	0	1	1
	Agriculture - farmyard buildings - direct hits				2	5	4	4	3	1.00	3	2	1	2	5	5	5	2	6	4	3	1	1	2	2	2	1	3	2	2	1	3	3
	Agriculture - key agricultural constraints on option (No.)				1	3	3	4	4	6.00	2	6	5	4	1	3	4	4	6	4	5	3	4	6	5	3	5	4	3	6	8	2	3
	Agriculture - Length of option on key agricultural constraints				0.45	1.25	1.04	1.42	0.65	2.65	0.52	1.94	1.45	1.54	0.45	0.94	1.04	1.07	2.09	1.42	2.04	1.30	1.45	1.95	1.94	1.07	1.45	1.50	1.00	2.21	2.59	0.70	1.43
	COMMUNITIES																																	
	Residential / Private Properties including farmhouse - direct hits	<1	1 - 3	>3	1	4	2	2	3	2	3	0	3	5	1	2	1	0	3	2	2	3	4	0	0	2	3	2	0	0	0	1	3
	Residential Gardens	<1	1 - 3	>3	4	4	1	0	0	1	2	3	2	3	5	3	1	0	1	0	1	2	3	0	3	2	2	0	0	1	1	0	0
	Community Impacts within 300m (schools, sports grounds & churches etc)	<1	-	≥1	2	0	2	0	0	0	0	1	1	4	2	0	2	0	2	0	2	0	1	0	0	2	1	0	0	1	1	0	0
	Green				3	2	4	5	5	3	4	4	4	1	3	4	4	7	3	5	2	4	2	5	6	2	4	4	9	5	5	8	7
	Orange				3	6	5	3	3	4	5	4	3	5	2	5	4	2	4	5	5	4	1	3	3	6	3	3	0	2	2	2	3
	Red				5	3	2	3	3	4	2	3	4	5	6	2	3	2	4	1	4	3	8	3	2	3	4	4	2	4	4	1	1
	Average score				1.818	1.909	2.182	2.182	2.182	1.909	2.182	2.091	2.000	1.636	1.727	2.182	2.091	2.455	1.909	2.364	1.818	2.091	1.455	2.182	2.364	1.909	2.000	2.000	2.636	2.091	2.091	2.636	2.545

8.4 Economy Assessment

A comparative cost estimate was developed for each option, dated to Q3 2020, in line with the TII Level 2 Cost Estimate spreadsheet as per the TII Cost Management Manual (2010)[12] and the latest TII guidance on presentation of Phase 2 comparative estimates. The comparative estimates are based on NDP designated cost ranges as summarised below*. The comparative construction costings were developed from TII Rates Schedules and from an analysis of rates from recent construction projects. Land costs were developed from recent land acquisition costs for recent sales in the vicinity, with severance, disruption, injurious affection and the like, with markups applied as per recent road schemes, and from an analysis of recent property sales in the area.

The costs are for comparison of options only, do not represent scheme budget and exclude inflation. Scheme budgets will be prepared at Phase 3 when the design is further developed.

** There are six categories of estimated project cost ranges as listed in the National Development Plan 2021 - 2030. Projects are grouped into these categories based on their latest cost estimates.*

- *Category A* *€20m - €50m cost range*
- *Category B* *€50m - €100m cost range*
- *Category C* *€100m - €250m cost range*
- *Category D* *€250m - €500m cost range*
- *Category E* *€500m - €1bn cost range*
- *Category F* *€1bn + cost range*

The comparative cost estimate for the initial preliminary options costings range between €180M and €300M, excluding inflation, and fall with Category C and Category D of the NDP cost ranges.

The scoring for the economy criteria for the options were assessed by banding the total costs in terms of:

- Lowest range of costs = Performance Score of 3
- Medium range of costs = Performance Score of 2
- Highest range of costs = Performance Score of 1

Costs for each option are listed in an order ranging from 1 to 29, with 1 being the least expensive option and 29 being the most expensive option. Refer to Table 8-22 for Stage 1 NDP Cost Category and cost order for each of the options.

[12] TII guidance document current at the time of the Phase 2 Stage 1 Cost Estimates. In December 2020, the Cost Management Manual was updated; TII Publications (Technical) PE-PMG-02044 (Dec. 2020).

Table 8-22 Stage 1 Economy Assessment Scores

	Options									
	1	2	3	4	5	6	7	8	9	10
NDP Cost Category	C	C	C	C	C	C	D	D	D	C
Cost Order	17	13	11	4	21	8	28	23	26	9
Performance Score	2	2	2	3	1	3	1	1	1	3

	Links																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
NDP Cost Category	C	C	C	C	C	C	C	D	D	C	C	D	D	C	C	C	C	C	C
Cost Order	20	6	15	3	12	10	5	29	24	19	22	27	25	14	1	16	18	2	7
Performance Score	1	3	2	3	2	3	3	1	1	2	1	1	1	2	3	2	2	3	3

8.5 Overall Stage 1 Assessment Summary

Upon completion of the assessment for each of the three Main Criteria of Engineering, Environment and Economy, the associated average performance scores for each of these Main Criteria were averaged to provide an overall performance score for each option. This Matrix is included in Volume 4.

Step 1 Elimination

Step 1 in eliminating options involved reviewing the options to establish whether any performed poorly across a number of criteria. The scoring criteria outlined previously assisted in this process but was not the governing factor in the elimination. Options were eliminated at this stage only on the basis of performing poorly across multiple criteria. At the conclusion of Step 1, 13 out of the potential 29 options had been eliminated due to their having a poorer ranking than other options on several criteria. These included:

- Length of Scheme
- Length of Link Roads
- No of Road Crossings,
- Earthworks cut/fill balance in excess of ±1,000,000 m3.
- Alignment Constraint (measure of the bendiness of the alignment)
- Impacts on community facilities such as schools, sports grounds etc.
- Impacts on residential dwellings
- Options passing through the proposed Natural Heritage Area at Lough Ramor
- Archaeology impacts
- Costs

The 13 options eliminated and reasons for their elimination are summarised in Table 8-23 below. The detailed assessments are discussed in sections above and presented in assessment matrix in Volume 4 Part B of the OSR. Option 01 Red, while having a number of poorly performing criteria, was retained for more detailed assessment in Phase 2: Stage 2 due to it following much of the alignment of the original N3 Virginia Bypass that received Part 8 approval in 2003. Consequently, much of the alignment of this option also has been protected in the Cavan County Development Plan 2014-2020.

Table 8-23 Step 1 Options Elimination

Stage 1 Option	Reasons for Elimination
Option 02 Purple East	**Engineering:** Alignment geometry (including non-standard horizontal curve), complex terrain and impacts on Bruse Hill County Geological Site & Murmod Hill due to topography (deep cuttings ≈18m and high embankments ≈15m) **Environment:** Longer length of corridor over soft ground (>4 km), direct property hits (>3).
Option 05 Light Green East	**Engineering:** Longer length of mainline **Environment:** Heritage (direct impact on historic demesne), longer length of corridor over soft ground (>4km), direct hits to agricultural properties, higher no. of key agricultural constraints impacted by the option and longer length of option crossing key agricultural constraints, direct property hits (1-3). **Cost:** Higher scheme costs
Option 06 Magenta West	**Environment:** Ecology (direct impact on Lough Ramor pNHA and River Boyne SAC/SPA) and potential impacts on flooding, air quality impacts as within 200m of River Boyne SAC/SPA, higher number of landscape & visual receptors impacted by the option, direct hits to agricultural properties, higher no. of key agricultural constraints impacted by the option and longer length of option crossing key agricultural constraints.
Option 07 Orange West	**Engineering:** Longer length of mainline, high number of road crossings, poor earthworks balance, complex terrain. **Environment:** Ecology (direct impact on River Boyne SAC/SPA), air quality impacts as within 200m of River Boyne SAC/SPA. **Cost:** Higher scheme costs
Option 08 Blue West	**Engineering:** Longer length of mainline, early deviation from existing N3 dual carriageway with the associated loss of approximately 2.5km of existing benefits, complex terrain, high number of road crossings and side road lengths, poor earthworks balance. **Environment:** Air quality as within 200m of River Boyne SAC/SPA, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option, community impacts within 300m. **Cost:** Higher scheme costs
Option 09 Red West	**Engineering:** Longer length of mainline, early deviation from existing N3 dual carriageway with the associated loss of approximately 2.5km of existing benefits, complex terrain, high number of road crossings and side road lengths, poor earthworks balance. **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, indirect impacts on higher no. of heritage sites, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option, community impacts within 300m. **Cost:** Higher scheme costs
Option 10 Yellow East	**Engineering:** High number of road crossings & side road lengths, poor alignment geometry **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, higher number of landscape & visual receptors impacted by the option, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option, property impacts, direct property hits (>3), community impacts within 300m.
Link 8 West	**Engineering:** Longer length of mainline, high number of road crossings & side road lengths, poor earthworks balance and complex terrain. **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, indirect impacts on higher no. of heritage sites, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option. **Cost:** Higher scheme costs
Link 9 West	**Engineering:** Longer length of mainline, high number of road crossings & side road lengths, poor earthworks balance and complex terrain.

Stage 1 Option	Reasons for Elimination
	Environment: Air quality impacts as within 200m of River Boyne SAC/SPA, noise impacts as higher PIR within 0-50m, ecology (direct impact on River Boyne SAC/SPA), higher number of landscape & visual receptors impacted by the option, direct impact on heritage sites and indirect impacts on higher no. of heritage sites, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option, direct property hits (>3), community impacts within 300m. **Cost:** Higher scheme costs
Link 10 West	**Engineering:** Longer length of mainline, poor earthworks balance **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, higher number of landscape & visual receptors impacted by the option, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option. **Cost:** Higher scheme costs
Link 11 West	**Engineering:** Longer length of mainline, high number of road crossings & side road lengths, poor earthworks balance and complex terrain. **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option. **Cost:** Higher scheme costs
Link 12 West	**Engineering:** Longer length of mainline, high number of road crossings, poor earthworks balance and complex terrain. **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, ecology (direct impact on River Boyne SAC/SPA), community impacts within 300m. **Cost:** Higher scheme costs
Link 13 West	**Engineering:** Longer length of mainline, high number of road crossings & side road lengths, poor earthworks balance and complex terrain. **Environment:** Air quality impacts as within 200m of River Boyne SAC/SPA, direct impact on a heritage site and indirect impacts on higher no. of heritage sites, direct hits to agricultural properties and higher no. of key agricultural constraints impacted by the option, community impacts within 300m. **Cost:** Higher scheme costs

Step 2 Elimination

The remaining 16 options after the Step 1 elimination are illustrated below in Figure 8-2. In Step 2 the process of refining the options involved grouping together those options which had similar characteristics and had substantial sections of alignment in common and assessing them against each other in a mini competition. The most appropriate option was retained for further assessment in Phase 2: Stage 2. Where options, or segments of options were deemed to perform equally, both were retained.

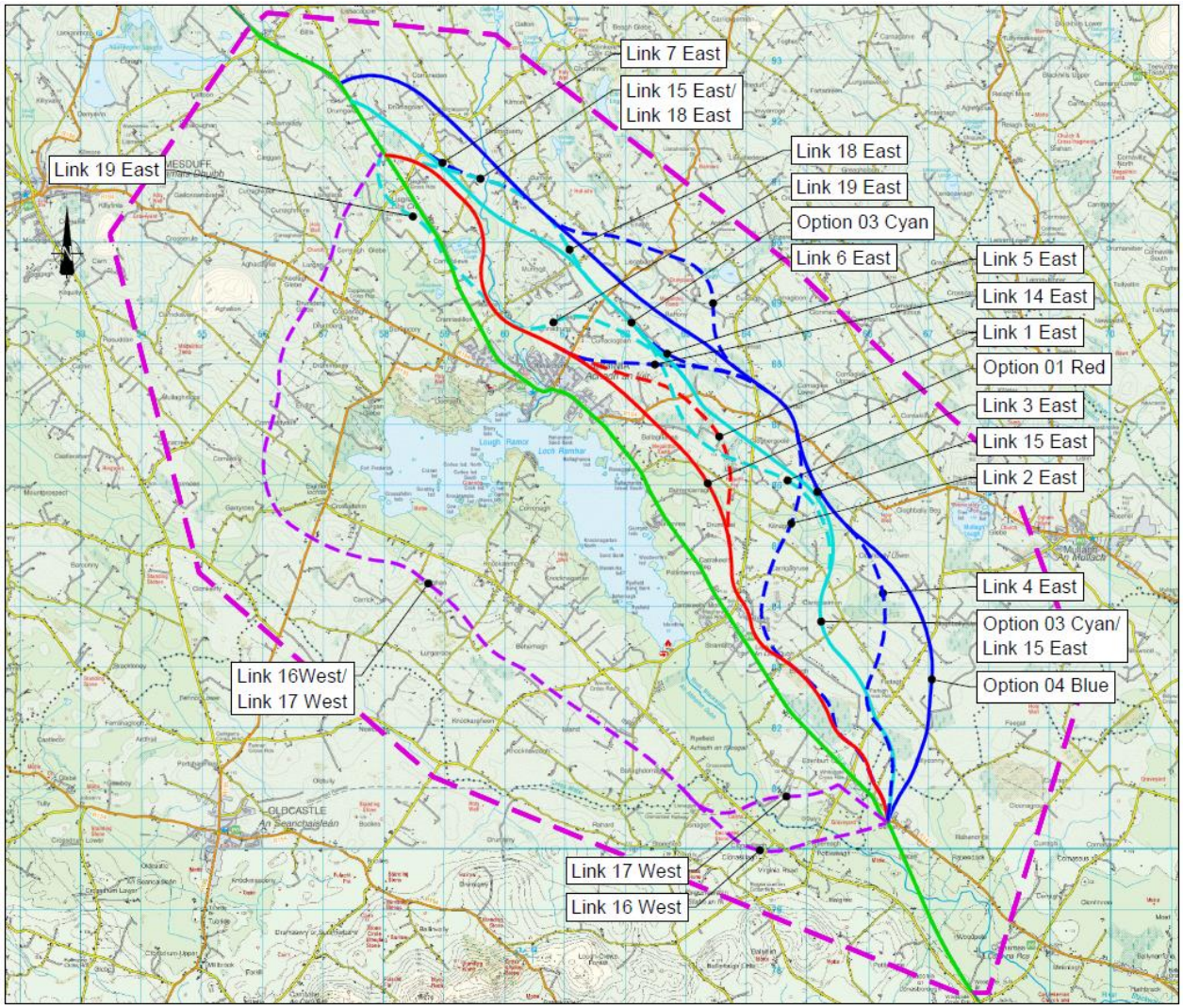


Figure 8-2: Stage 1 Options Assessed in Step 2

The Step 2 Elimination / Mini Competition concluded with an additional 12 options being eliminated for reasons discussed in Table 8-24.

Table 8-24 Options and Links Eliminated in Step 2

Option Eliminated	Reasons for Elimination	
	Mini Competition	**Primary reasons**
Link 1 East	Link 1 East was compared with Option 01 Red	Link 1 East had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, length of link roads, alignment geometry, earthworks balance **Environment:** Major impacts on five ecological sites, longer length of corridor over soft ground, higher number of direct hits to agricultural properties, higher number of residential gardens impacted. **Cost**.
Link 3 East	Link 3 East was compared with Option 03 Cyan	Link 3 East had fewer overall preferred elements and performed poorer for:

Option Eliminated	Reasons for Elimination	
	Mini Competition	Primary reasons
		Engineering: higher number of road crossings, length of link roads and side roads, alignment geometry **Environment:** Major impacts on three ecological sites, direct impact on a heritage site and indirect impacts on higher no. of heritage sites. **Cost**.
Link 19 East	Link 19 East was compared with Link 18 East	Link 19 East had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, side road crossings, side road lengths, watercourse crossings. **Environment:** Air quality impacts (higher number of properties within 50m of carriageway), noise impacts (higher PIR), longer length of corridor within mature woodlands and higher number of watercourse crossings, higher number of landscape & visual receptors impacted by the option, higher no. of key agricultural constraints impacted by the option and longer length of corridor over key agricultural constraints, higher number of direct property hits. **Cost**.
Option 03 Cyan	Option 03 Cyan was compared with Link 18 East	Option 03 Cyan had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, link road lengths, strategic service crossings, watercourse crossings, alignment geometry **Environment:** Air quality impacts (higher number of properties within 50m of carriageway), noise impacts (higher PIR), longer length of corridor within mature woodlands and higher number of watercourse crossings, higher number of ecological sites impacted, longer length of corridor over soft ground, indirect impacts on higher no. of heritage sites, higher no. of key agricultural constraints impacted by the option and higher number of direct hits to agricultural properties, higher number of direct property hits, community impacts within 300m. **Cost**.
Link 7 East	Link 7 East was compared with Option 04 Blue	Link 7 East had fewer overall preferred elements and performed poorer for: **Engineering:** side road crossings, side roads lengths, small watercourse crossings, alignment geometry. **Environment:** Air quality impacts (higher number of properties within 50m of carriageway), noise impacts (higher PIR), higher number of ecological sites impacted and higher number of watercourse crossings, indirect impacts on higher no. of heritage sites, higher number of residential gardens impacted, community impacts within 300m. **Cost**.
Link 6 East	Link 6 East was compared with Option 04 Blue	Link 6 East had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, side road crossings, side road lengths, earthworks balance, alignment geometry. Link 6 is affected negatively by the topography in Lisnabantry, resulting in a deep cutting and high embankment.

Option Eliminated	Reasons for Elimination	
	Mini Competition	Primary reasons
		Environment: Noise impacts (higher PIR), higher number of landscape & visual receptors impacted by the option. **Cost**.
Link 5 East	Link 5 East was compared with Option 04 Blue	Link 5 East had fewer overall preferred elements and performed poorer for: **Engineering:** side road crossings, side road lengths, small watercourse crossings, alignment geometry. Link 5 had a deep cutting and high embankment (approx. 15 metres) in the vicinity of Murmod Hill. **Environment:** Air quality impacts (higher number of properties within 50m of carriageway), noise impacts (higher PIR), higher no. of key agricultural constraints impacted by the option and higher number of direct hits to agricultural properties, higher number of residential properties/gardens impacted, community impacts within 300m. **Cost**.
Link 2 East	Link 2 East was compared with Option 04 Blue	Link 2 East had fewer overall preferred elements and performed poorer for: **Engineering:** road crossings, side road lengths, small watercourse crossings, alignment geometry, deep cutting through Bruise Hill **Environment:** Noise impacts (higher PIR), longer length of corridor within mature woodlands and higher number of ecological sites impacted, indirect impacts on higher no. of heritage sites, higher number of residential gardens impacted. **Cost**.
Link 14 East	Link 14 East was compared with Option 04 Blue	Link 14 East had fewer overall preferred elements and performed poorer for: **Engineering:** link road lengths, strategic services crossings, river crossings (northern section of Link 14 contains 3 significant river crossings), alignment geometry **Environment:** Noise impacts (higher PIR), higher number of landscape & visual receptors impacted by the option. **Cost**.
Option 04 Blue	Option 04 Blue was compared with Link 4 East	Option 04 Blue had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, side road lengths, earthworks balance. Option 04 has a deep (≈17m) cutting at Cloghbally Lower **Environment:** Air quality impacts (higher number of properties within 50m of carriageway), noise impacts (higher PIR), higher number of direct property hits. Option 04 Blue is very close to Killyconny Bog SAC and therefore a negative indirect impact cannot be ruled out. **Cost**.
Northern section of Link 4 East	Link 4 East was compared with Link 15 East	The Northern section of Link 4 East had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, small watercourse crossings, alignment geometry

Option Eliminated	Reasons for Elimination	
	Mini Competition	**Primary reasons**
		Environment: Higher no. of key agricultural constraints impacted by the option. **Cost**.
Link 17 West	Link 17 West was compared with Link 16 West	Link 17 West had fewer overall preferred elements and performed poorer for: **Engineering:** mainline length, link road lengths, earthworks balance, alignment geometry **Environment:** noise PIR **Cost**.

The summary of the Stage 1 Assessment shown in Table 8-25.

Table 8-25 Stage 1 Assessment Matrix Summary

Ref.		Criteria Performance Score			Overall Performance Score	Ranking to inform elimination	Option Elimination		Options Retained for Stage 2
		Engineering	Environment	Economy			Step 1	Step 2	
Options	1	2.18	1.82	2.00	6.00	19			✓ *see note 1*
	2	2.45	1.91	2.00	6.36	13	✓		
	3	2.55	2.18	2.00	6.73	11		✓	
	4	2.55	2.18	3.00	7.73	6		✓	
	5	2.27	2.18	1.00	5.45	20	✓		
	6	2.36	1.91	3.00	7.27	8	✓		
	7	2.00	2.18	1.00	5.18	22	✓		
	8	2.00	2.09	1.00	5.09	25	✓		
	9	2.18	2.00	1.00	5.18	22	✓		
	10	2.27	1.64	3.00	6.91	10	✓		
Links	1	2.18	1.73	1.00	4.91	28		✓	
	2	2.45	2.18	3.00	7.64	7		✓	
	3	2.45	2.09	2.00	6.36	13		✓	
	4	2.36	2.45	3.00	7.91	4		✓	
	5	2.36	1.91	2.00	6.27	17		✓	
	6	2.45	2.36	3.00	7.73	5		✓	
	7	2.00	1.82	3.00	7.27	9		✓	
	8	2.09	2.09	1.00	5.09	25	✓		
	9	2.27	1.45	1.00	4.55	29	✓		
	10	2.18	2.18	2.00	6.45	12	✓		
	11	2.09	2.36	1.00	5.45	20	✓		
	12	2.18	1.91	1.00	5.09	25	✓		
	13	2.18	2.00	1.00	5.18	22	✓		
	14	2.36	2.00	2.00	6.36	13		✓	
	15	2.55	2.64	3.00	8.18	1			✓
	16	2.27	2.09	2.00	6.36	13			✓
	17	2.18	2.09	2.00	6.27	18		✓	
	18	2.55	2.64	3.00	8.18	1			✓
	19	2.55	2.55	3.00	8.09	3		✓	

Note 1 – Carried forward to Stage 2 as 60%+ of alignment is similar to the 2003 Part 8 alignment.

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

Having completed the Stage 1 Preliminary Options Assessment, a total of 4 shortlisted do-something option feasible corridors were taken forward to Stage 2 of the Phase 2 Option Selection process.In accordance with TII Publications (Technical) PE-PMG-02042, the Do-Minimum option was brought forward from the Stage 1 (Preliminary Options Assessment) process.

In addition, it was identified that elements of some link options shall be retained for further investigation and assessment as the local variations may demonstrate a better alternative passing through some constrained areas. These are listed below:

- Link 1: A segment of Link 1 that can connect Option 01 Red to Link 18 at Lislea & Cornashesk townlands. This option would be further from Virginia Town, and avoid the crossing of the river 3 times compared to Option 01 Red.
- Link 5: A segment of Link 5 that can connect Link 15 to Link 18 at Cornashesk townland. The impacts of this alternative segment can be compared with those of Link 15 when assessed in more detail.
- Link 19: The section of Link 19 crossing of the N3 north of Virginia may be beneficial for Option 01 Red as it would avoid the crossing of the river 3 times compared to Option 01 Red. This segment can also be assessed for the do-minimum option where online improvements though the high collision site at Lisgrea cross may necessitate taking the alignment off-line.

The updated corridor option names carried forward to the Stage 2 assessment are presented in Table 8-26 and the alignments are illustrated in Figure 8-3. This brought the total to 10 shortlisted options.

Table 8-26 Naming and Colour Changes of Corridor Options

Stage 1 Option	Stage 2 / 3 Option Colour & Name	
Do-Minimum	Green	A
Link 16 West	Purple	B
Option 01 Red	Red	C
Option 01 Red with Link 1 East element to Link 18 East	Grey	Cv1
Option 01 Red with Link 19 East element	Grey	Cv2
Link 18 East	Orange	D
Link 18 East + Link 4 East element	Grey	Dv1
Link 15 East	Pink	E
Link 15 East + Link 4 East element	Pink	Ev1
Link 15 East + Link 5 East element to Link 18 East	Grey	Ev2

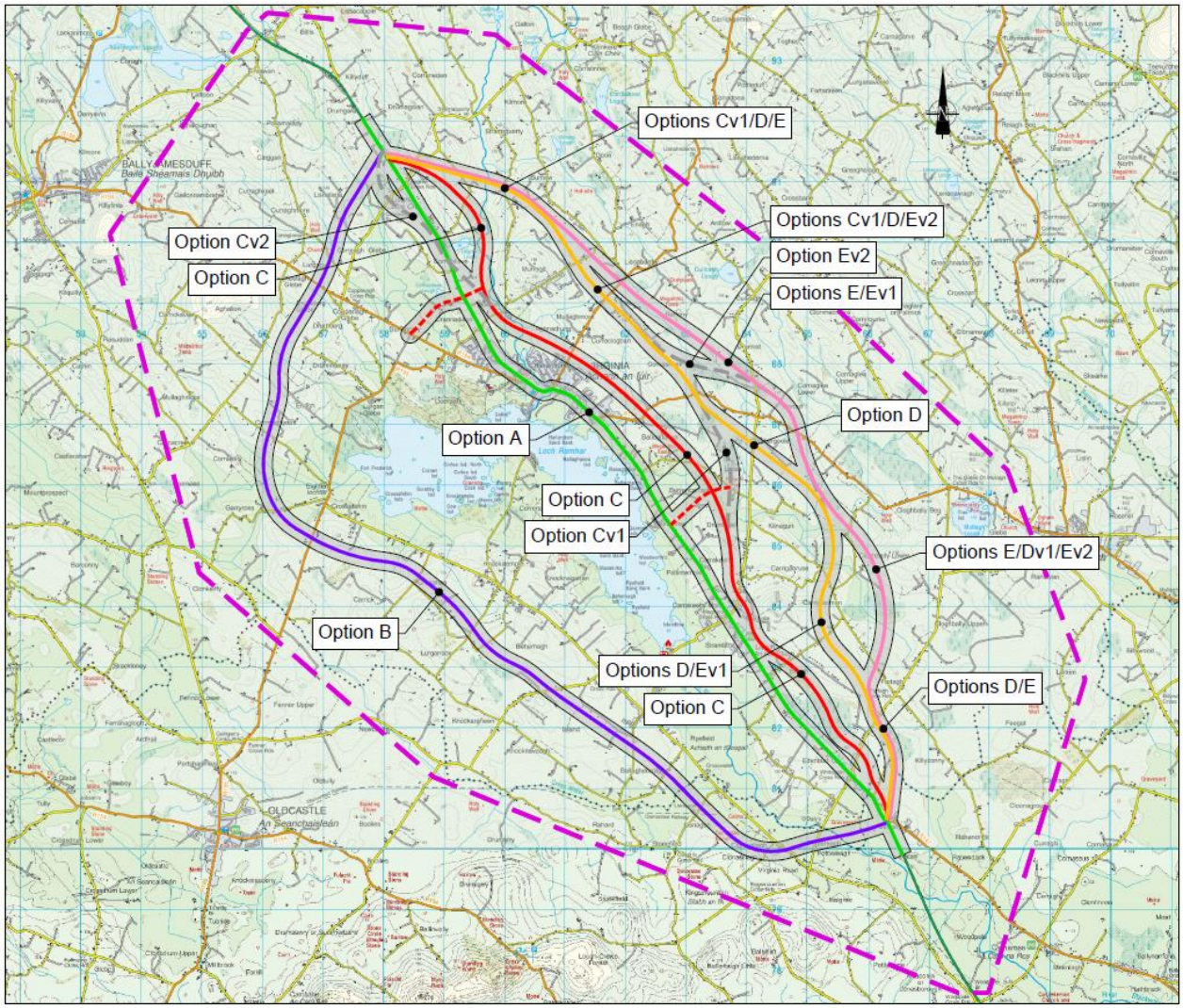


Figure 8-3 Proposed Stage 2 Options

SECTION 9: STAGE 2 – PROJECT APPRAISAL MATRIX

This section represents the Phase 2: Stage 2 – Project Appraisal Matrix – Scoring Criteria & Elimination Working Paper for the N3 Virginia Bypass and is developed in accordance with the requirements of the Transport Infrastructure Ireland (TII) Project Management Guidelines (January 2019), Project Appraisal Guidelines (PAG) Unit 4.0: Consideration of Alternatives and Options and PAG Unit 7.0: Multi Criteria Analysis (both October 2016). The methodology is outlined in Section 6.

9.1 Shortlisted Options

Do Minimum

In accordance with TII Publications (Technical) PE-PMG-02042, the Do-Minimum option must be brought forward from the Stage 1 (Preliminary Options Assessment) process. As discussed in section 5.3, the Do-Minimum option would not provide the appropriate cross-section and junction improvements required to achieve the level of service, journey time reliability, safety and economic benefit required to meet the project objectives. It was therefore concluded that the Do-Minimum option as defined in TII's PAG Unit 4.0 was not considered to be a feasible alternative. As a variation to a Do minimum, a combination of online and offline alignment was considered that would investigate online improvements between the Derver Roundabout to Maghera and again north of Virginia Town from Cornaslieve to Lisgrea, with an offline alignment around Maghera and Virginia. This was therefore carried forward into the Do Something Options as Option A (online / offline combination). The original Do-minimum alignment and the amended Option A alignment are shown in Figure 9-3 below.

Do Something

Shortlisted options B, C, D and E and 5 option variations were identified as having the lowest overall impact and greatest benefit from the Stage 1 assessment and were selected for progression to Stage 2 of the Option Selection Process. In addition, Option A as described above was also carried forward.

All options incorporate a corridor with a typical width of 300m to allow for further refinement during the design development. At the start of Stage 2, the options were further developed within the option corridors to reduce impacts where feasible and to improve on geometric design. The Ten shortlisted options and variations between options are described in Table 9-1 and outlined in Figure 9-1 and Figure 9-2 below.

Table 9-1 Stage 2 Options and Option Variations

Option Name	Corridor Option Description
Option A (Green)	This option was originally envisaged as an online upgrade option. During the Stage 1 and early Stage 2 assessment process, it became evident that such an upgrade of the existing road would not meet the objectives of the scheme. The option was then amended so that it would encompass an online upgrade for a distance of approximately 3km, south of Maghera. From there it veers to the northwest to join the Option C alignment at Carrigabruise. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Aghnadrung. It follows the Option C alignment for a distance of approximately 8.5km, veering to the north west to meet the existing N3 at Cornaslieve north of Virginia. From Cornaslieve the option would consist of an online upgrade, passing through Lisgrea Cross before terminating approximately 400-500m to the north of the crossroads. It crosses the Blackwater River once, north of Virginia. Link roads from the existing N3 to the option at Burrencarragh and from the R194 Ballyjamesduff Road to the option at Cornaslieve were also investigated for this option.
Option B (Purple)	This option is approximately 18.5km in length and commences at the N3/R147 roundabout at Derver. It is the only option that passes to the west of Virginia Town and Lough Ramor. From Derver the option goes in a south-westerly direction, crossing the Blackwater River SAC / SPA

Option Name	Corridor Option Description
	and veering to the north west after approximately 2km. The option crosses the Cross Water River and passes through Munterconnaught. It crosses the R195 Oldcastle Road at Eighter, before veering to the north east and crossing the R194 Ballyjamesduff Road at Lurgan. It crosses the Dunancory River before meeting the existing N3 north of Lisgrea Cross.
Option C (Red)	This option is approximately 14.7km in length and commences at the N3/R147 roundabout at Derver. It passes to the east of Virginia Town and Lough Ramor. From Derver the road follows roughly parallel to the existing N3, before veering slightly more to the north at Carrigabruise townland. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Aghnadrung. It crosses the Blackwater River three times north of Virginia before meeting the existing N3 north of Lisgrea Cross. Approximately 60% of the option is common to the route of the N3 Virginia Bypass which achieved Part 8 planning approval in 2003. Link roads from the existing N3 to the option at Burrencarragh and from the R194 Ballyjamesduff Road to the option at Cornaslieve were also investigated for this option.
Option C variant 1 (Cv1)	This option is approximately 14.9km in length and commences at the N3/R147 roundabout at Derver. It follows the Option C alignment for a distance of approximately 5.5km, veering to the north to join Option D at Cornashesk, near where that option crosses the R194 Mullagh Road. From here the alignment follows Option D, crossing the R178 Bailieborough Road at Curracloghan. The option crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross. A link road from the existing N3 to the option at Burrencarragh was also investigated for this option.
Option C variant 2 (Cv2)	This option is approximately 14.6km in length and commences at the N3/R147 roundabout at Derver. It follows the Option C alignment for a distance of approximately 11.5km, veering to the north west to cross the existing N3 at Cornaslieve north of Virginia. From Cornaslieve the option runs almost parallel to, and west of, the existing N3 before veering to the north east to meet the existing N3 north of Lisgrea Cross. It crosses the Blackwater River once, north of Virginia. Link roads from the existing N3 to the option at Burrencarragh and from the R194 Ballyjamesduff Road to the option at Cornaslieve were also investigated for this option.
Option D (Orange)	This option is approximately 15.2km in length and commences at the N3/R147 roundabout at Derver. It passes to the east of Virginia Town and Lough Ramor. From Derver the road passes first in a northerly, then north westerly direction, roughly parallel to the existing N3. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Curracloghan. The option crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option D variant 1 (Dv1)	This option is approximately 15.4km in length and commences at the N3/R147 roundabout at Derver. It follows the Option D alignment for a distance of approximately 2km, before veering to the north east to join Option E. It follows this option for a distance of approximately 4km, before rejoining Option D. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Curracloghan. It crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option E (Pink)	This option is approximately 15.5km in length and commences at the N3/R147 roundabout at Derver. It passes to the east of Virginia Town and Lough Ramor. From Derver the road passes in an approximately northerly direction, then veering north westerly, roughly parallel to the existing N3. The option crosses the R194 Mullagh Road at Corfad and the R178 Bailieborough Road at Cornashesk. It crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.

Option Name	Corridor Option Description
Option E variant 1 (Ev1)	This option is approximately 15.3km in length and commences at the N3/R147 roundabout at Derver. It follows the Option E alignment for a distance of approximately 2km, before veering to join Option D. It follows this option for a distance of approximately 4km, before rejoining Option E. The option crosses the R194 Mullagh Road at Corfad and the R178 Bailieborough Road at Cornashesk. It crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.
Option E variant 2 (Ev2)	This option is approximately 15.7km in length and commences at the N3/R147 roundabout at Derver. It follows the Option E alignment for a distance of approximately 8.5km, before veering west to join Option D. It follows this option for the remainder of its length. The option crosses the R194 Mullagh Road at Cornashesk and the R178 Bailieborough Road at Curracloghan. The option crosses the Blackwater River once, north of Virginia, and meets the existing N3 north of Lisgrea Cross.

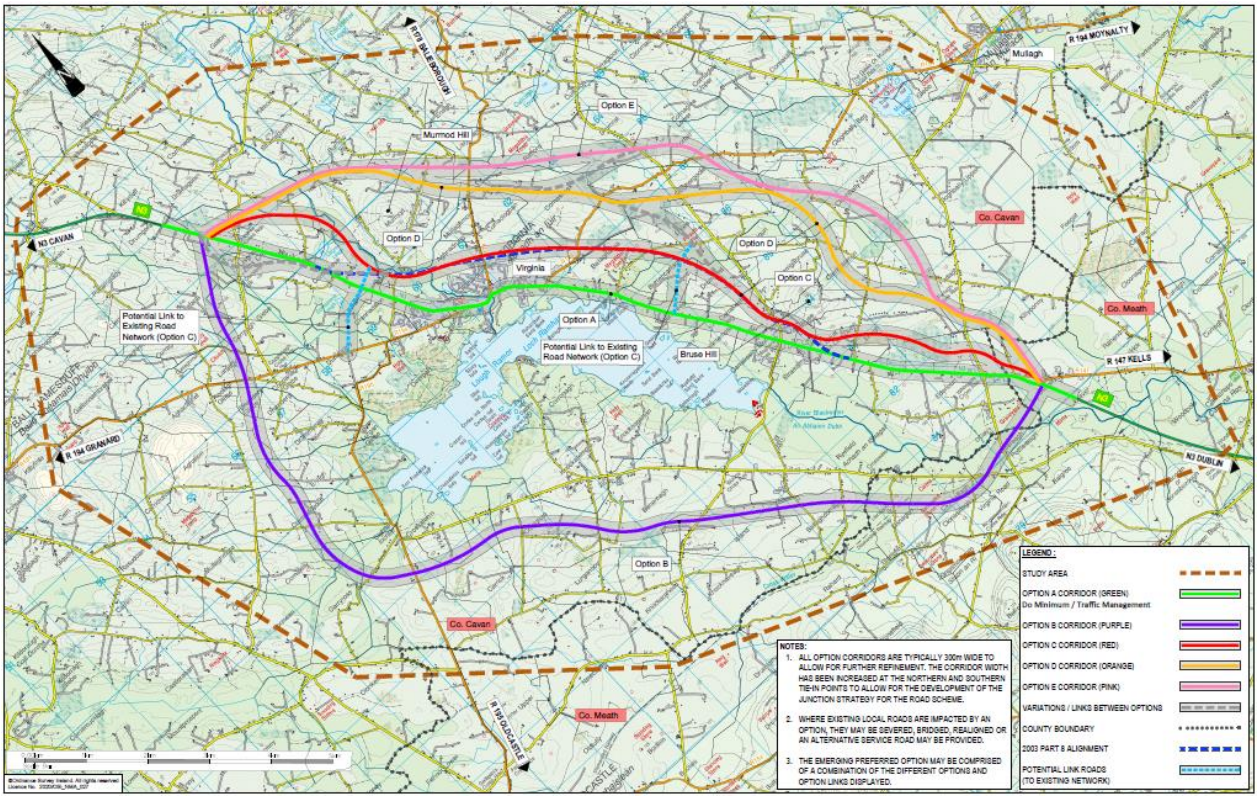


Figure 9-1 Stage 2 Option Corridors

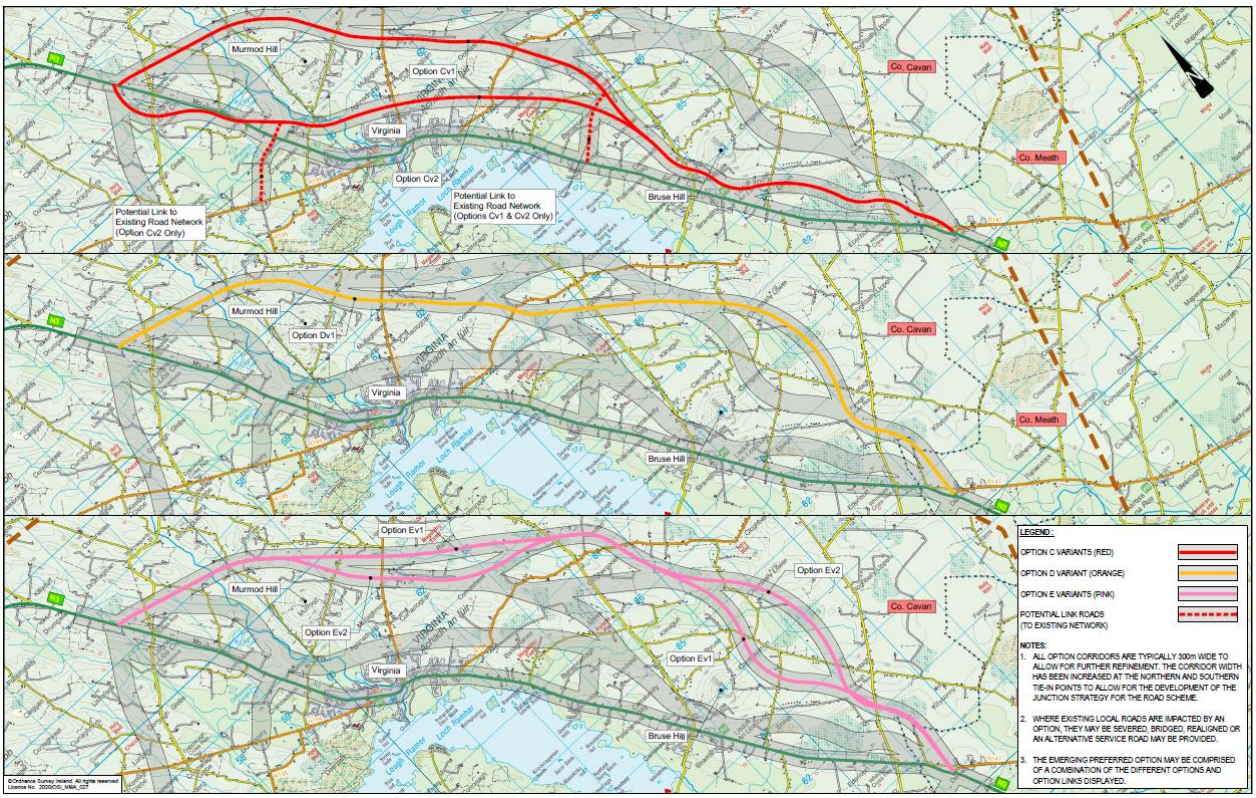


Figure 9-2 Stage 2 Option Variants

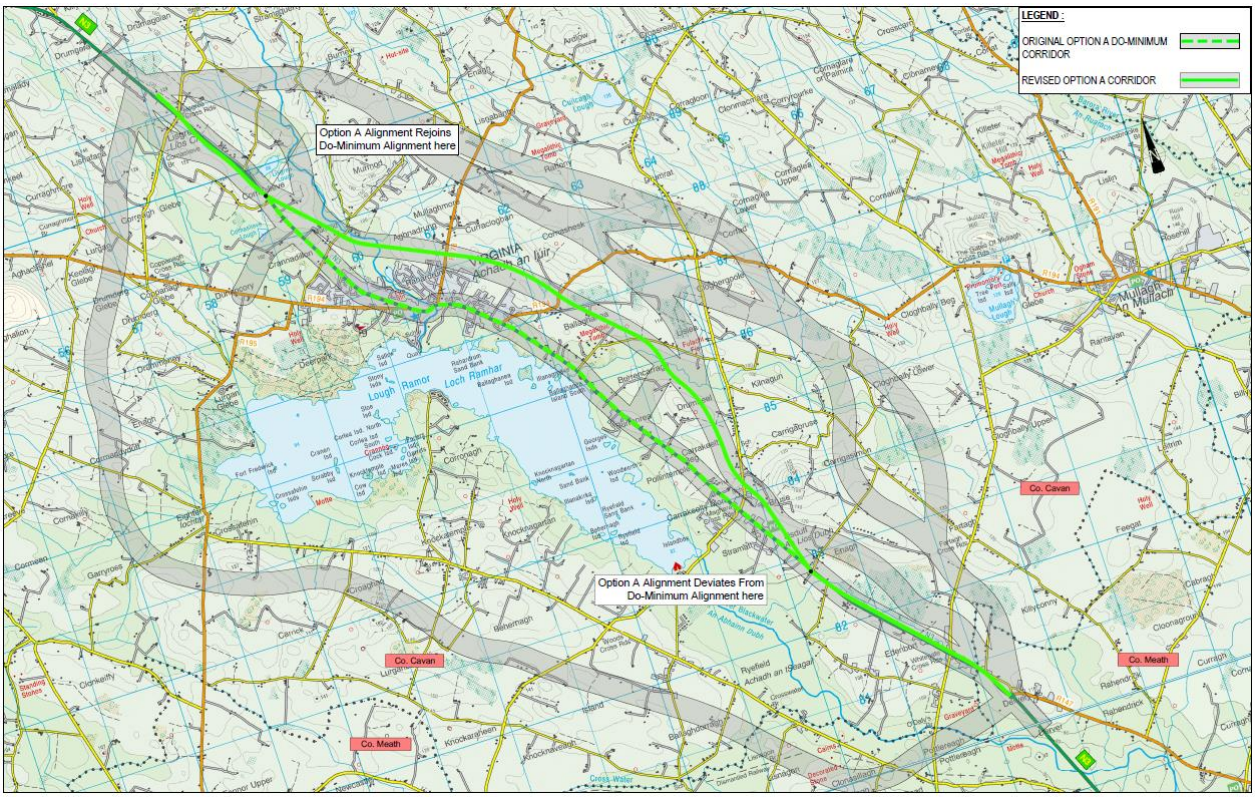


Figure 9-3 Do-Minimum & Option A Alignments

Traffic Management Provision

The Assessment of Alternatives analysis concluded that a multi-modal transport solution is the most appropriate mode to achieve the project objectives with elements of an active mode solution integrated into the roads intervention to support modal shift, (Section 5.4 above). In addition some elements of Demand Management measures, such as traffic management measures, in combination with a road-based intervention can also provide benefits and assist in supporting modal shift. Included as part of the Do Minimum scenario for this modelling assessment are the following Traffic Management proposals. These measures aim to make the town safer and more attractive for vulnerable road users.

- Reconfigured signal timings in the town to facilitate longer pedestrian / cyclist crossing times;
- Improvements to the public realm in the Main Street, including the construction of four additional zebra crossings and change of the N3/R194 Ballyjamesduff Road junction to a roundabout junction.

In addition to the Do-Minimum measures outlined above, a ban on HGVs travelling through Virginia Town (with unloading and loading of deliveries permitted only) has been assumed to be in place in all Do Something scenarios. These traffic management measures form an integal part of each of the options as they help to improve the existing conditions for VRUs in the town centre by providing a more suitable alternative route for through traffic and HGV traffic that does not need to stop in the town.

Active Travel Provision

In addition to the Demand Management measures above, reducing traffic, especially HGV traffic from the Virginia Town, will enable improvement of the public realm environment and facilitate improvements for walking and cycling that will provide a safer and healthier environment conducive to active travel and therefore be aligned with the Town Centre First Policy which recognises that successful places:

- Are characterised by an attractive public realm (streets, spaces and parks) that is designed to invite people to meet, mingle and dwell;
- Are well connected and accessible to sustainable modes of transport, enabling a high proportion of journeys to be made by foot and /or bicycle from the immediate hinterland (e.g. the ‘10 minute town’ concept);
- Manage traffic within central areas so that streets prioritise vulnerable users (pedestrians and cyclists), enabling them to move about safely and in comfort.

The provision of footpaths and cycleways segregated from traffic, will facilitate safe, efficient travel by active modes both as a primary mode and as a supporting mode to access public transport, at a local level. For the purposes of the Stage 2 assessment all Shortlisted options were envisaged to comprise a Type 2 Dual Carriageway cross-section with an adjoining 3m shared two-way cycle and pedestrian facility with a minimum separation distance of 3m from the traffic lane. This cross section will be confirmed during Phase 3 Design and Environmental Evaluation.

9.2 Economy Appraisal

9.2.1 Introduction

The Economic assessment of the options aims to determine and compare the relative economic benefits of each option, drawing conclusions from qualitative and quantitative assessments. The Economy Appraisal has been undertaken in accordance with TII’s PAG Unit 6.0: Cost Benefit Analysis Overview, PAG Unit 6.1: Guidance on Conducting CBA, PAG Unit 6.2: Preparation of Scheme Costs, PAG Unit 6.3 Guidance on Using TUBA, PAG Unit 6.4: Guidance on Using COBALT, PAG Unit 6.9 Wider Impacts, PAG unit 6.10 Reliability and Quality, PAG Unit 6.11 National Parameters Values Sheet and PAG Unit 7.0: Multi-Criteria Analysis.

The Economy appraisal was assessed under the following sub-criteria:

- Transport Efficiency and Effectiveness
- Wider Economic Impacts
- Quality and Reliability
- Funding Impacts

9.2.2 Transport Efficiency and Effectiveness

Comparative scheme estimates were completed for the options considered during Stage 2 in accordance with the TII Cost Management Manual (CMM)[13], using historic TII rates[14] and other road works rates of more recent contracts and indexed using the Wholesale Price indices and Society of Chartered Surveyors Ireland (SCSI) as well as discussing pavement rates with Contractors to reflect market conditions in 2021. Land costs were developed from recent land acquisition costs for recent sales in the vicinity, with severance, disruption, injurious affection and the like markups applied as per recent road schemes, and from an analysis of recent property sales in the area.

The comparative cost estimates were based on preliminary high level alignment designs prepared during the Stage 2 assessment, with assumptions made regarding junction types, bridge requirements, suitability of earthwork materials and accommodation works requirements and various other design assumptions. The costs are for comparison of options only, do not represent scheme budget and exclude inflation. Scheme budgets will be prepared at Phase 3 when the design is further developed.

The comparative cost estimates are presented as per the order of magnitude ranges included in the NDP*.

** There are six categories of estimated project cost ranges as listed in the National Development Plan 2021 - 2030. Projects are grouped into these categories based on their latest cost estimates.*

- *Category A* *€20m - €50m cost range*
- *Category B* *€50m - €100m cost range*
- *Category C* *€100m - €250m cost range*
- *Category D* *€250m - €500m cost range*
- *Category E* *€500m - €1bn cost range*
- *Category F* *€1bn + cost range*

Costs for each option are listed in an order ranging from 1 to 10, with 1 being the least expensive and 10 being the most expensive. Refer to Table 9-2 for Stage 2 scheme NDP Cost Category and cost order for each of the options.

Table 9-2 NDP Cost Category

Options	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
NDP Cost Category)	C	C	C	C	C	C	C	C	C	C
Cost Order / Ranking	6	9	10	1	4	8	7	5	3	2

Note:

i. OCE are prepared for option comparison purposes only and to inform the selection of the preferred option.

ii. The OCE were prepared based on Q3 2021 costings and make no provision for inflation.

[13] TII Publications (Technical) PE-PMG-02044 (December 2020)

[14] TII Publications (Technical) CC-GMP-00054 (October 2019)

Table 9-3 below sets out the relative Benefit Cost Ratio scorings. These ratios have been calculated using TUBA and COBALT. The BCRs were assessed as positive for all options. Option B was assessed as having the lowest BCR. The ratios in Table 9-3 are expressed relative to the BCR for Option B.

Table 9-3 Impact scoring of options in terms of Transport Efficiency and Effectiveness

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
BCR	**Positive BCR (1.28x)**	**Positive BCR (x)**	**Positive BCR (1.31x)**	**Positive BCR (≈1.09x)**	**Positive BCR (≈1.35x)**	**Positive BCR (1.22x)**	**Positive BCR (≈1.11x)**	**Positive BCR (1.13x)**	**Positive BCR (≈1.17x)**	**Positive BCR (≈1.19x)**
Impact Description	* Highly Positive	Mod Positive	Highly Positive	* Mod Positive	* Highly Positive	Mod Positive	* Mod Positive	Mod Positive	* Mod Positive	* Mod Positive
Impact Score	7	6	7	6	7	6	6	6	6	6

** Estimated Impacts*

9.2.3 Wider Economic Impacts

Competition in the Market

Transport improvements can sometimes affect the competitiveness of a market by linking two geographic markets that were previously separate and thereby reducing the cost of accessing a wider market. This would increase competition within the enlarged market, as consumers would have a wider choice of suppliers. This would in turn increase efficiency and consumer welfare. As highlighted in TII's PAG Unit 7.0, most road projects are deemed to score neutral in this regard. The road scheme options offer improvements to the road network between Dublin and the North-West and therefore may help reduce the cost of accessing different markets. Therefore, all options are scored slightly positive.

Agglomeration

Agglomeration benefits can arise when markets or firms are able to derive additional productivity from being located closer together. These benefits would arise where a reduced travel time between two production centres would result in an improvement in supply and contracting arrangements. TII PAG unit 6.9 states that 'Agglomeration impacts should only be assessed if the road scheme impacts on an urban area with, at its core, a working population of 60,000 and a minimum of seven jobs per hectare. For rural inter-urban road schemes agglomeration impacts are not expected to be significant contributors to economic benefit.' The road scheme options offer localised improvement to the road networks and therefore benefits do not arise when markets or firms derive additional productivity. Therefore, all options are scored neutral.

Inward Investment

TII's PAG Unit 7.0 states that the potential of the proposed project in attracting sustainable inward investment should be considered. If a road scheme is being progressed at the request of an inward investor, then that scheme should be evaluated as having a positive impact on inward investment. Conversely, TII's PAG Unit states that projects which could harm investment opportunities should be assessed as having a negative impact.

Taking account of PAG Unit 7.0's guidance in terms of positive impacts, the proposed scheme is not being progressed as a request of a specific inward investor. The Cavan County Development Plan 2014 – 2020 and the draft Development Plan 2022 - 2028, references a Strategic Development Site to the south of Virginia Town and Cavan County Council have identified these lands for economic use primarily; referred to as Burrencarragh Economic Lands. A number of the Options with a link road through the Burrencarragh lands and potential junction with the proposed bypass option would be attractive to inward investment in these areas. Therefore, the options with the Burrencarragh link road are scored moderately positive.

Labour Supply

TII's PAG Unit 7.0 highlights that 'better transport links may increase a market's employment catchment', providing firms with a larger pool of potential employees, which may reduce difficulties in recruiting the right candidate for a job vacancy. TII's PAG Unit 6.9 highlights that providing the increase in the supply of labour by 'taking workers out of unemployment, rather than through increased immigration (or the return of expatriate workers)', would have a wider positive impact. However, TII's PAG Unit 6.9 highlights that 'the impacts of a transport improvement on employment are in the main re-distributional' and that the anticipated benefit 'is likely to be small (as transport schemes do not generally have a large impact on employment at the national level).'

The N3 Virginia Bypass options offer improvements to the road networks which may result in better transport links between other labour markets, however it is unlikely to contribute significantly to an increase labour market. Therefore, all options are scored neutral.

Urban Regeneration

The N3 Virginia Bypass options offer improvements to the road networks with the objective of reducing through traffic including HGV and therefore easing congestion within the town. Some of the options will contribute to a significant reduction in traffic flow through Virginia Town centre and the options with the Ballyjamesduff link road and the Burrencarragh link road will remove significant HGV traffic and would enable a HGV / axle ban from the town centre. A reduction of traffic from the town will enable improved and expanded active travel within the town and contribute to sustainable places to live and work thus contributing to meeting some of the National Strategic Objectives (NSO) underpinning the National Planning Framework. The options that reduce traffic by 70% to 80% and would enable a HGV / axle ban from the town centre are scored Highly Positive. Options that reduce traffic by 40% to 60% and would not enable a HGV / axle ban from the town centre are scored Slightly Positive.

Wider Economic Impacts Summary

The table below summarises the scoring for each component of the wider economic impact sub-criterion. The average of all the components gives the overall impact score for wider economic impacts.

Table 9-4 Impact scoring of options in terms of Wider Economic Impacts

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Competition in the Market	5	5	5	5	5	5	5	5	5	5
Agglomeration	4	4	4	4	4	4	4	4	4	4
Inward Investment	6	4	6	6	6	4	4	4	4	4
Labour Supply	4	4	4	4	4	4	4	4	4	4
Urban Regeneration	7	5	7	5	7	5	5	5	5	5
Overall Impact Score (rounded average)	**5**	**4**	**5**	**5**	**5**	**4**	**4**	**4**	**4**	**4**

9.2.4 Transport Quality and Reliability

Journey quality effects can be of two principal kinds: constant effects and time related effects. Reliability is a measure of variation in journey times that transport users are unable to predict, as opposed to the type of variation that might arise between peak and off-peak times or due to seasonal impacts. Unreliable journey times are most likely to be experienced due to congestion, which will occur when the ratio of traffic volume to capacity is highest. High volume to capacity ratios are normally associated with peak travel times. TII's PAG Unit 6.10 – Reliability and Quality[15] suggests identifying links with the highest volume to capacity ratios in the peak period and ascertaining whether any of these exceed a 70% threshold in the Design Year.

There are existing junction locations within Virginia where the volume to capacity ratio of the Do-Minimum network exceeds 70%, namely the N3 / R178 Bailieborough Road Traffic Signal Junction and the N3/R194 Ballyjamesduff Road Junction. All of the options would reduce the level of congestion at these locations in the future.

TII's PAG unit 6.10 indicates that despite the inherent difference between reliability and journey quality, it is essentially the traffic volume to capacity ratio, which is likely to drive any variation in perceived quality. As such these measures are not assessed separately.

All options for the scheme would improve transport quality and reliability. Some of the options will contribute to a significant reduction in traffic flow through Virginia Town centre and the options with the Ballyjamesduff link road and the Burrencarragh link road will remove significant HGV traffic and would enable a HGV / axle ban from the town centre thus contributing to reducing traffic congestion through the existing junctions along the N3. The options that reduce traffic by 70% to 80% and would enable a HGV / axle ban from the town centre are scored Moderately Positive. Options that reduce traffic by 40% to 60% but do not enable a HGV / axle ban from the town centre are scored Slight Positive.

9.2.5 Funding Impacts

On schemes where non-exchequer funding is available, this is considered in the MCA process under the Sub Criterion of 'Funding Impacts'. It is unlikely that a road scheme of the scale of the N3 Virginia Bypass will avail of non-exchequer funding. At this stage, for the purposes of the Option Selection Process, it is assumed that all options would be 100% Irish exchequer funded. Therefore, in line with PAG Unit 7.0 all options score 'Neutral'.

[15] TII Publications (Technical) PE-PAG-02029 (October 2016)

9.2.6 Economy Appraisal Summary

Upon the determination of a single overall performance score for each of the four sub-criteria, each of these scores was added together to provide an overall Economy Appraisal performance score for each of the Option Corridors.The results of the Economy Appraisal are shown in Table 9-5 below.

Table 9-5 Economy Appraisal – Impact Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Transport Efficiency & Effectiveness	7	6	7	6	7	6	6	6	6	6
Wider Economic Impacts	5	4	5	5	5	4	4	4	4	4
Transport Quality and Reliability	6	5	6	5	6	5	5	5	5	5
Funding Impacts	4	4	4	4	4	4	4	4	4	4
Overall Economy Appraisal Impact Score	22	19	22	20	22	19	19	19	19	19

9.3 Safety Appraisal

9.3.1 Introduction

The safety assessment considers safety impacts as part of the Project Appraisal (Multi-Criteria Analysis). The Project Appraisal Guidelines (PAG) for National Roads Unit 7.0 - Multi Criteria Analysis (TII 2016) guidance document identifies two principal road safety criteria to be considered with respect to safety. These are as follows:

- Collision reduction
- Security of road users

The assessment also includes the findings of the following two safety reports:

- Road Safety Audit (RSA) Stage F Part 1 Report; completed as a comparative assessment of the options from a road safety perspective, in accordance with the requirements of GE-STY-01024.
- Road Safety Impact Assessment (RSIA); undertaken in accordance with PE-PMG-02001, to compare the options in terms of potential road safety implications of each option, while considering the safety benefits and dis-benefits arising from each option.

9.3.2 Collision Reduction

The road safety benefits of each of the main options were quantitatively assessed using the Irish version of COBALT (Cost and Benefit to Accidents – Light Touch), which is software developed to undertake analysis of the impact on accidents as part of the economic appraisal of a road scheme. COBALT quantifies the change in the number of collisions and casualties as a direct result of a road project and compare against the collisions estimated along the existing road. A local collision rate was calculated along the existing road and used as the basis of the collision calculations for the existing road; see Section 2.3.6 above. All do-something options provide benefits over a 30 year assessment period in terms of collision reduction. The COBALT assessment indicates a reduction in fatal accidents in the order of 13 to 21, serious accidents in the order of 41 to 75 and slight injury accidents in the order of 198 to 392. Financial benefits were in the order of €21.4m to €36.4 million. These benefits accrue as the bypass options will result in traffic following

a safer alignment and removing a significant volume of traffic, including HGV traffic from within Virginia Town and other section of the existing N3 that currently has a high collision rate. The use of COBALT to assess the collision reduction benefits is described in more detail in Volume 6 of the Option Selection Report.

See impact score in Table 9-6 below.

Table 9-6 Impact scoring of options in terms of Collision Reduction

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Collision Reduction	6	6	7	6	7	6	6	6	6	6

9.3.3 Security of Road Users

The N3 within the study area is currently a sub-standard single carriageway for much of the route that has numerous roadside hazards. There are also poor opportunities for overtaking. Through Virginia Town the road cross section is such that strategic traffic conflicts with VRUs. All bypass options propose a shared pedestrian/cycle facility within the mainline cross-section. This will provide an improvement in safety and security of pedestrians and cyclists.

Furthermore, all new bypass Options will cater for strategic traffic and goods vehicles, which will significantly reduce the traffic volumes on the town centre and the local road network. Some of the options will contribute to a significant reduction in traffic flow through Virginia Town centre and the options with the Ballyjamesduff link road and the Burrencarragh link road will remove significant HGV traffic and would enable a HGV / axle ban from the town centre thus contributing to reducing traffic congestion through the existing junctions along the N3. The options that reduce traffic by 70% to 80% and would enable a HGV / axle ban from the town centre are scored Highly Positive. Options that reduce traffic by 40% to 60% but do not enable a HGV / axle ban from the town centre are scored Moderate Positive. See impact score in Table 9-9 below.

9.3.4 Road Safety Audit (Stage F, Part 1)

A Stage F Road Safety Audit Part 1 was undertaken on the main 5 options, Options A to E, which examined the options to consider all matters that may have an adverse effect on road safety and the perspective of all road users. Option C was assessed with and without link roads. The Road Safety Audit Report notes that all the proposed options represent a significant improvement to the existing N3 and would provide a significant improvement to safety along the route.

All options have been compared and subsequently ranked in preference based on safety considerations. The optimum route in terms of road safety is Option C (without link roads).

Table 9-7 Option comparison Table from Road Safety Audit Stage F Part 1

Options	Overtaking	VRU Impacts	No. Junctions	Alignment	Mainline Tie-In	Side Roads
Option A	Neutral	Preferred	Least Preferred	Least Preferred	Least Preferred	Neutral
Option B	Neutral	Neutral	Neutral	Preferred	Least Preferred	Least Preferred
Option C (without links)	Neutral	Preferred	Preferred	Least Preferred	Preferred	Neutral
Option C (with links)	Neutral	Preferred	Least Preferred	Least Preferred	Preferred	Least Preferred

Options	Overtaking	VRU Impacts	No. Junctions	Alignment	Mainline Tie-In	Side Roads
Option D	Neutral	Neutral	Neutral	Least Preferred	Preferred	Preferred
Option E	Neutral	Neutral	Neutral	Least Preferred	Preferred	Neutral

The Stage F (Part 1) road Safety Audit reports that "*As the Stage F (Part 1) is a high level safety audit of a number of options, there may be very little differences between offline options from a road safety perspective and thus the preferred Stage F (Part 1) ranking may not be consistent with the preferred option and does not imply that the preferred option may be less safe."* As such findings of a road safety audit were not used to form part of the safety assessment.

9.3.5 Road Safety Impact Assessment

As part of the Road Safety Impact Assessment (RSIA), an understanding of the overall impact that each option would have on the proposed and existing road network was determined by reviewing the preliminary Option selection alignment designs and comparing qualitative and quantitative data.

The data reviewed to complete the RSIA includes, but is not limited to:

- Collision history, frequency and location.
- Geometric design of options.
- Location, frequency and design of junctions.
- Indicative future traffic flows and AADT data.
- Potential impact on local traffic patterns.
- Potential impact on vulnerable road users and provision for these users.
- COBALT assessment data.

All Do Something Options will provide a significant benefit in terms of road safety in comparison to the existing N3 approaching and through Virginia Town.

All Do Something Options will provide improved infrastructure and reduced conflict points for all motor vehicle users and reduce the amount of traffic on the existing N3 and Virginia Town centre. This will drive a consequential benefit of improved road experience for non-motorised users within the town, while also incorporating new segregated infrastructure for pedestrians/cyclists on the new mainline.

Options aligning to the east of Virginia align with expected "desire lines" of N3 strategic traffic. Option A includes a combination of online upgrade with associated link roads and an offline realignment. It is the shortest of all options (13.96km) and has the most junctions along its length (6), generating the most conflict points of all Do Something options. The level of infrastructure provision on this option will be constrained compared to other options due to part of the route being online. It performs similarly to Option C in terms of future traffic volumes in Virginia (Link 24, in the centre of Virginia Town ~AADT 2,150).

Options D and E align furthest to the east. Both have similar lengths (15.2km and 15.5km respectively) and similar COBALT Values, and both Options have 4 junctions along the mainline. Although Options D and E intercept the R178 and R194 roads to the east of Virginia, neither option has a link to the R194 Ballyjamesduff Road meaning there is a greater likelihood for traffic to/from Ballyjamesduff to have to utilise the existing residual road network. Future traffic volumes for both options in Virginia (Link 24, in the centre of Virginia Town) would be in the region of AADT 6,200 to 6,500.

Conversely, Option B to the West of Virginia performs in a different way to the rest of the routes. This route is the longest (18.5km), and generates the most traffic on the mainline, after Options A and C, which could

be attributed to the use it will receive from Ballyjamesduff traffic. It performs similarly to Options D and E in terms of future traffic volumes in Virginia (Link 24, in the centre of Virginia Town ~AADT 6,000). Option B intercepts the R194 and R195 to the west of Virginia, but provides no connection from to the regional roads on the east of Virginia (R178 Bailieborough or R194 Mullagh), forcing traffic to utilise the existing residual road network.

Option C aligns to the east of Virginia and is closest to the town itself, giving some potential for severance of communities at Maghera, Virginia etc. This option has a significant reduction of traffic through Virginia Town centre (Link 24, in the centre of Virginia Town ~2,150) compared with the other options, giving higher potential for improved environment for road users, including NMUs in Virginia. As the option aligns to the east of Virginia, it intercepts the R178 and R194 roads. It also includes a link to the R194 Ballyjamesduff Road, all of which help reduce likelihood of traffic using the residual road network. However, this Option also has 5 potential junctions along its 14.7km length whereas Options B, D and E all have 4 potential junctions over a longer length. This shortens the weaving distances available to traffic on the Type 2 dual carriageway and increases the potential for the mainline to be used for local trips, resulting in mixing of strategic and local traffic.

The inclusion in Options A and C of link roads north and south of Virginia (i.e. the Burrencarragh Link Road and the Ballyjamesduff Link Road) offers the potential for the implementation of a HGV / Axle ban within Virginia Town centre with the only permitted HGV access to the town being for deliveries within the town. Similar link roads are not proposed for Options B, D and E, due to the topography of the region and the distances involved. Therefore there is no potential for implementing a HGV / Axle ban in Virginia for these options as HGVs associated with logistics and industrial facilities in the region would otherwise have to travel long distances to access the bypass.

Considering the overall benefits of each option in terms of road safety impact and the preference of options as part of the RSIA, an impact score has been applied to each option in accordance with the TII PAG 1 -7 scale.

Table 9-8 Impact scoring of options in terms of RSIA

Options	Impact Description	Impact Score
Option A	Slightly Positive	5
Option B	Moderately Positive	6
Option C	Highly Positive	7
Option D	Moderately Positive	6
Option E	Moderately Positive	6

9.3.6 Safety Appraisal Summary

Upon the determination of a single overall performance score for each of the three sub-criteria, each of these scores was added together to provide an overall Safety Appraisal performance score for each of the Option Corridors.The results of the Safety Appraisal are shown in Table 9-9 below.

Table 9-9 Safety Appraisal – Impact Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Collision Reduction	6	6	7	6	7	6	6	6	6	6
Security	7	6	7	6	7	6	6	6	6	6
RSIA	5	6	7	6	7	6	6	6	6	6
Overall Safety Appraisal Impact Score	18	18	21	18	21	18	18	18	18	18

9.4 Environment Appraisal

9.4.1 Introduction

Environmental Impact Assessment is a process that includes information gathered throughout all planning and design phases of the project. The assessment of alternatives (Phase 2) is a key part of Environmental Impact Assessment. While an Environmental Impact Assessment Report may be prepared at Phase 3 (Design and Environmental Evaluation) of the project for the Preferred Option and is not required at this stage of the process, the Option Selection Report and all associated information gathered during Phase 1 and 2 of the Scheme may contribute to it and the environmental topics considered at this stage are based on the topics that may be considered in an Environmental Impact Assessment.

TII have identified a number of environmental sub criteria to be assessed as part of the Phase 2: Stage 2 assessment within the PAG Unit 7.0 Guidelines. TII have also published specific guidelines for a number of these environmental sub criteria, detailing guidelines for assessment at various stages of national road schemes. Where available, these guidelines were used in addition to EIA guidelines and principles to ensure consistency throughout the various stages as far as reasonably practical. In the absence of TII guidelines for a specific sub criteria EIA guidelines and principles were used.

The EIA Directive as transposed into Irish law, outlines factors for inclusion in an Environmental Impact Assessment Report (which may be completed at Phase 3). These factors have been elaborated on by TII and EPA guidelines and professional judgement plays a role. In assessing a road scheme, the following are taken into account:

- National Legislation – The European Union (Roads Act 1993) (Environmental Impact Assessment) (Amendment) Regulations 2019 (SI 279/2019)[16];
- National Guidelines – EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports Draft August 2017;
- National Transportation Guidelines – TII Publications PE-PAG-02031 Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (October 2016); and
- National Transportation Planning and Construction Guidelines for Transportation Projects – TII guidelines on environmental topics.

Table 9-10 clarifies how the Stage 2 Option Selection environmental criteria identified in Unit 7.0 of the TII PAG have been structured throughout this section of the report to allow consistency with the EIA Directive

[16] The EIA Directive was transposed into Irish legislation. The 2019 Regulations have amended the 1993 Roads Act and will be the legislative basis of the assessment.

and national EIA legislation at Phase 3. It should be noted that additional topics will be assessed at Phase 3 in the Environmental Impact Assessment Report, as required by the EIA Directive. These include major accidents and disasters, and interactions (including cumulative assessment).

Table 9-10 Stage 2 Environmental Appraisal Sub-Criteria

National Legislation (Regulations 2019) and National Guidelines (EPA 2017)	National Transportation Guidelines (Table 7.1.3, TII 2016 PE-PAG-02031)	Stage 2 Environmental Appraisal Sub-Criteria
Population and Human Health	Air Quality and Climate, Noise, Landscape and Visual (including Light), Waste, Non-Agricultural Properties, Agriculture	**Section 9.4.2** Air Quality and Climate **Section 9.4.3** Noise **Section 9.4.4** Landscape and Visual (including light) **Section 9.4.6** Waste **Section 9.4.11** Material Assets – Non-Agricultural **Section 9.4.12** Agriculture
Biodiversity	Biodiversity – Flora and Fauna	**Section 9.4.5** Biodiversity – Flora and Fauna
Land	Soils and Geology, Hydrogeology, Agriculture	**Section 9.4.7** Soils and Geology **Section 9.4.8** Hydrology **Section 9.4.9** Hydrogeology **Section 9.4.12** Agriculture
Soil	Soils and Geology, Hydrogeology, Agriculture	**Section 9.4.7** Soils and Geology **Section 9.4.8** Hydrology **Section 9.4.9** Hydrogeology **Section 9.4.12** Agriculture
Water	Hydrogeology, Hydrology	**Section 9.4.8** Hydrology **Section 9.4.9** Hydrogeology
Air*	Air Quality and Climate	**Section 9.4.2** Air Quality and Climate **Section 9.4.3** Noise
Climate	Air Quality and Climate	**Section 9.4.2** Air Quality and Climate
Material Assets	Non-Agricultural Properties	**Section 9.4.11** Material Assets – Non-Agricultural** **Section 9.4.12** Agriculture
Cultural Heritage	Architectural Heritage, Archaeological and Cultural Heritage	**Section 9.4.10** Cultural Heritage
Landscape	Landscape and Visual (including light)	**Section 9.4.4** Landscape and Visual (including light)

*Noise is not specifically identified in the EIA Directive or national legalisation but as noise is transmitted through air, it is taken to be included here.

**The scope of Non-Agricultural Properties as identified in TII PAGs has been widened to include Non-Agricultural Material Assets aligning with the EIA Directive.

A summary of the Environment Appraisal is provided in the sections below, whilst a detailed description of the appraisal is provided in the Stage 2 Environmental Appraisal Report in Volume 5 (Stage 2 Environmental Appraisal Report), with supporting environmental drawings provided in in Volume 2 (Constraints & Environmental Drawings). The Environment Appraisal has been undertaken in accordance with TII's PMM, TII's PAG Unit 7.0: Multi Criteria Analysis, TII's Environmental Planning Guidelines, and other relevant

national and international guidance (discussed in each section below). The corridor options were assigned impact scores using TII 7- point scale as discussed in Section 6.3. The purpose of this appraisal is to comparatively assess the impact of each corridor option against the existing baseline conditions in terms of how each option performs against the main criterion of Environment.

9.4.2 Air Quality and Climate

AONA Environmental Consulting were commissioned to conduct Air Quality and Climate assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 2 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

This assessment has been completed in accordance with the following relevant guidance notes;

- NRA (now TII) Guidelines for the Treatment of Air Quality in National Road Schemes during the Planning and Construction of National Road Schemes (Revised May 2011).

In accordance with the NRA (now TII) Guidelines for the Treatment of Air Quality in National Road Schemes during the Planning and Construction of National Road Schemes (2011), the following are considered as part of a Stage 2 assessment:

- Changes to baseline air quality conditions noted in the Stage 1 assessment;
- Calculation of the index of overall change in exposure for the existing route and each route option in the opening year;
- Calculation of local-scale pollutant concentrations; and
- Impacts on sensitive ecosystems.

Once these four elements have received detailed consideration, corridor options should be ranked with respect to air quality and climate.

An assessment of the impact on climate change (including greenhouse gas (GHG) emissions) from the construction phase and operational phase of the proposed options has been undertaken using the Transport Infrastructure Ireland (TII) calculation tool for assessing lifecycle carbon emissions for national road and light rail infrastructure projects in Ireland. The purpose of the tool is to assist Transport Infrastructure Ireland to comply with the requirements of the Environmental Impact Assessment Directive, which requires European Union (EU) Member States to assess the impact of projects on climate change (including greenhouse gas emissions) as part of the EIA process.

Assessment

Baseline Air Quality Conditions

The EPA air quality monitoring stations at Cavan town and Navan were used to monitor air quality conditions around the Study Area from January 2021 to July 2021. It was identified that since Stage 1 assessment there has been no changes to baseline air quality conditions noted and the limit values for Nitrogen Dioxide (NO_2,) and Particulate Matter ((PM_{10} and $PM_{2.5}$) have not been breached at the Cavan or Navan monitoring stations from January to July 2021.

Calculation of the Index for Overall Change in Exposure

The Calculation of the Index of Overall Change in Exposure allows a comparison of the overall impact on people for each route option to be carried out. The assessment of the calculation of the index for overall change in exposure is completed using the UK DMRB assessment for regional assessment. The index of overall change in exposure was calculated for NO_2 and PM_{10} for the different options. A negative index score indicates that there would be an overall reduction in exposure to pollution, i.e., a beneficial impact, a positive index score indicates an increase in exposure to pollution, i.e. adverse impact. Table 2-2 to 2-23 in Volume 5 of Option Selection Report show results for overall change in exposure for each route option for nitrogen oxides and particulate matter.

A summary of the assessment is shown in Table 9-11. In terms of the Index of Overall NO_x and PM_{10} Exposure, the first ranked option is Option A, Option C is the 2nd most preferred option and Option Cv2 is the 3rd most preferred option. Option E and Option Ev1 could be rated as the worst ranked options.

Table 9-11 Summary of Index of Overall NOx and PM_{10} Exposure for each Option

Options	NO_x Exposure Index	Better or Worse	Rank	PM_{10} Exposure Index	Better or Worse	Rank
Existing	638.6	-	-	19.1	-	-
Option A	-613.5	Better	1	-17.5	Better	1
Option B	-487.4	Better	4	-12.4	Better	8
Option C	-558.1	Better	2	-15.7	Better	2
Option Cv1	-453.9	Better	6	-12.7	Better	=5
Option Cv2	-553.7	Better	3	-15.6	Better	3
Option D	-452	Better	8	-12.8	Better	4
Option Dv1	-448.8	Better	9	-12.7	Better	=5
Option E	-440.9	Better	=10	-12.3	Better	=9
Option Ev1	-440.9	Better	=10	-12.3	Better	=9
Option Ev2	-452.5	Better	7	-12.7	Better	=5

Calculation of the Local Scale Pollutant Concentrations

The TII guidelines states that if there are sensitive receptors within close proximity to one or more route options, i.e, within 10m of the edge of the road, it is necessary to predict pollutant concentrations at Stage 2. However, no residential properties will be within 10m of any of the proposed offline options.

Impacts on Sensitive Ecosystems

The TII guidelines states that consideration should be given to all designated sensitive sites that are within 200m of any road that could be affected by the proposed scheme, both during operation and construction. Where the scheme is expected to cause an increase in concentrations of more than 2 µg/m3 and the predicted concentrations (including the background) are close to (within 10% of), or exceed the standard, then the sensitivity of the habitat to NOx should be assessed by the project Ecologist.

Option B traverses the River Boyne and River Blackwater SAC approximately 800m to the west of the existing N3 alignment. The DMRB model to assess the potential impact on the SAC resulted that Option B is predicted to result in an increase in concentrations of more than 2 µg/m^3 at the River Boyne and River Blackwater SAC. However, the existing N3 already traverses the River Boyne and River Blackwater SAC

at approximately 1 Km from the proposed new crossing point along Option B. This indicates that the River Boyne and River Blackwater SAC is currently exposed to similar NOx concentrations and nitrogen deposition rates.

Climate Impacts

The lifecycle carbon emissions for the scheme were calculated using the TII Transport Infrastructure Ireland Carbon Tool for Road and Light Rail Projects: Guidance. It was concluded that in comparison to the total greenhouse gas emissions in Ireland in 2019 of 59,777.6 kt CO_2 equivalent (Ireland's National Inventory Report, EPA 2021), Option B will result in the highest carbon emissions with 0.2893% of annual greenhouse gas emissions.

Results

Based on the elements of Option Selection outlined in Guidelines for the Treatment of Air Quality in National Road Schemes during the Planning and Construction of National Road Schemes (Revised May 2011), in terms of the Index of Overall NO_x and PM_{10} Exposure, the Preferred Option may be deemed to be Option A. Option Cv2 is the 2nd most preferred option. Option C is the 3rd most preferred option. Option D is the 4th most preferred option. In terms of the Index of Overall NO_x and PM_{10} Exposure, Option Cv1, Option E and Option Ev1 could be rated as the worst ranked options. In terms of the TII Carbon Tool for lifecycle carbon emissions for each proposed options, Option E is preferred with Option B least preferred. However, there is relatively little difference between any of the proposed options in comparison to the total greenhouse gas emissions in Ireland in 2019 of 59,777.6 kt CO2 equivalent.

It is important to consider that the existing air quality in the study area is of good quality and no option will result in an exceedance of the air quality standards or pollutant concentrations limit values. In terms of future operation of the proposed options and emission from vehicles, it is important to note that the road traffic volume already exists on the existing N3 road network and therefore, the future emission from vehicles is not an additional greenhouse gas emission. Therefore, there will be no significant climate impact due to the operation of the proposed N3 Virginia bypass options in comparison to the existing N3 road network alignment.

The elements of Option Selection outlined in Guidelines for the Treatment of Air Quality in National Road Schemes during the Planning and Construction of National Road Schemes (Revised May 2011), has allowed for a determination of the best ranked option for the N3 Virginia Bypass as outlined below.

Table 9-12 Air Quality Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	5	Minor or Slightly Positive	Most Preferred	1
Option B	5	Minor or Slightly Positive	Intermediate	8
Option C	5	Minor or Slightly Positive	Most Preferred	2
Option Cv1	5	Minor or Slightly Positive	Intermediate	=5
Option Cv2	5	Minor or Slightly Positive	Most Preferred	3
Option D	5	Minor or Slightly Positive	Intermediate	4
Option Dv1	5	Minor or Slightly Positive	Least Preferred	=5
Option E	5	Minor or Slightly Positive	Least Preferred	=9
Option Ev1	5	Minor or Slightly Positive	Least Preferred	=9
Option Ev2	5	Minor or Slightly Positive	Intermediate	=5

9.4.3 Noise

AONA Environmental Consulting were commissioned to conduct Noise assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 3 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

This assessment has been completed in accordance with the following relevant guidance notes.

- TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes (October 2004); and
- Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014).

The Guidelines for the Treatment of Noise & Vibration in National Road Schemes (2004) state that "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 National Roads Project Management Guidelines 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 for the Treatment of Noise & Vibration in National Road Schemes (2004), states that there are three elements to the Option Selection. These elements consist of the following.

- An assessment of potential impact based upon property counts;
- A consideration of likely changes in traffic flow; and
- A review of the need for, and difficulties associated with, noise mitigation measures.

Once these three elements have received detailed consideration, corridor options should be ranked with respect to noise. Each impact was scored based on TII's seven-point scale (PE-PAG-02031).

The Authority has undertaken a review of the Guidelines for the Treatment of Noise & Vibration in National Road Schemes (2004). This review was based on the experiences acquired from the implementation of the original draft guidelines and on a validation study that was undertaken to assess the applicability of the specified design criteria and the functionality of the various Transport Research Laboratory (TRL) conversion methodologies for Irish road conditions. This review provides guidance on the revised design criteria and the application of validated approaches to deriving the L_{den} values as well as an overview of the baseline monitoring and model validation procedure. The new Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes is based on the lessons learned from post EIA noise evaluations studies and research undertaken on the design of noise barriers. It provides advice and information for use by acousticians, and it is also relevant for traffic, motorway and pavement engineers. The advice amplifies and supplements the original noise guidelines, and it should be read in conjunction with that document. The Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014) references the approach to preferred route option selection as was outlined in the 2004 Guidelines.

Assessment

Potential Impact Rating Calculations

This aspect of the option selection process has involved identification of all sensitive receptors within 300m of each option and assigning into one of four "bands". These bands are defined by their distance to either side of the centre line of each corridor option. Band 1 is from 0 to 50m of the centre line, Band 2 is from 50

to 100m, Band 3 is from 100 to 200m and Band 4 is from 200 to 300m. The total number of receptors in each band has been multiplied by a rating factor. The rating factor is 4 for Band 1, 3 for Band 2, 2 for Band 3 and 1 for Band 4. The resultant values have been summed to give a single number for each corridor option, termed the Potential Impact Rating (PIR). The PIR values (Table 9-13) have been used to assess the potential impact of each corridor option, the larger the PIR the greater the potential impact.

As detailed in Volume 5 of Option Selection Report (Section 3.4.2), in terms of PIR Option Ev2 and Ev1 are ranked as the 1st and 2nd ranked option respectively, in terms of potential noise impact as they have fewer properties within 0 – 300m of the centreline of the proposed option. Option Cv2 and Option A are rated as the least preferred options in terms of potential noise impact, as they have the highest number of properties within 0 – 300m of the centreline of the proposed option.

Assessment of Changes in Traffic Flow

An assessment of the potential changes in traffic flow data was conducted based on the traffic data provided (Table 9-13). The TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes, states that an estimate should be made of the number of receivers where traffic flows are likely to increase or decrease by 25% or more. The traffic flow data for the Future Year 2043 indicates that there will be a reduction in the AADT volumes on the existing N3 alignment, with the proposed options taking a percentage of the traffic flows when in operation.

Option C, Option Cv1 and Option Cv2 will result in the most significant reduction in traffic flows along the existing N3, and hence most significant reduction in noise levels along the existing N3 alignment. The highest predicted future AADT volumes will be on Option A and therefore, this option will result in the highest noise levels at nearby receivers. Option C and Option Cv2 are predicted to have relatively high predicted future AADT volumes. Therefore, these options will result in higher noise levels at nearby receivers. Option A, Option C and Option Cv2 are in relatively close proximity to Virginia and hence, have a high number of residential properties in close proximity as shown in the PIR analysis.

Assessment of the Likely Need for Mitigation Measures

A prediction of the likely noise levels at receivers in proximity to the proposed options based on the Design Year 2043 AADT volumes was carried out using the Calculation for Road Traffic Noise (CRTN) calculation methodology and CadnaA noise modelling software. The noise level prediction parameter is the Lden noise indicator as specified in the TII document “Guidelines for the Treatment of Noise and Vibration in National Road Schemes”. The worst-case predicted noise levels at receivers in proximity to the proposed options indicate that noise mitigation measures will potentially be necessary in order to achieve the design goal of 60dB Lden at certain existing properties. This will depend on proximity to the preferred option alignment, the proximity to the existing road network, the final horizontal and vertical alignment design relative to existing topography and the existing and proposed traffic volumes in proximity to the property. The predicted future noise level as well as the difference between the existing noise level and the predicted future noise level will determine if noise mitigation measures will be required.

A cutting of greater than or equal to 2m in depth will potentially provide significant traffic noise attenuation at properties in proximity to such cuttings. The plan and profile for each of the options were reviewed and the extent of deep cutting with a height greater than or equal to 2m was determined for each option (Table 9-13). This indicated that the option that will provide to greatest extent of ‘natural’ noise attenuation within the design will be Option B due to the greatest extent of cuttings along this option. Option C has the lowest extent of deep cuttings along its alignment.

Construction Noise

The construction noise limits will be applied to all options, hence no differentiation between the options.

Results

The prevailing noise climate in the study area of the corridor options varies from rural areas with low background noise levels to linear roadside residential properties, residential estate development and properties in close proximity to the existing N3 which experience an elevated noise level due to traffic flows on the existing N3.

Table 9-13 outlines a ranking of the 'preferred order' of the corridor options based on the three elements of Option Selection outlined in "The TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes", including an assessment of potential impact rating (PIR) based upon property counts, a consideration of likely changes in traffic flow, and a review of the need for and difficulties associated with noise mitigation measures.

Table 9-13 Option Comparison Based on 3 Elements of 'Route Corridor Selection' (TII, 2004)

Stage 2 Options	0-50m	50-100m	100-200m	200-300m	PIR Sub-Total	PIR Rank 0 - 300m	PIR Rank 0 - 50m	AADT & Link Length	Percentage of Option in deep cutting (>2m)	Maximum number of properties potentially within 60 dB L_{den} contour	Overall Option Ranking
Option A	68	105	184	204	561	9	10	Length (m) / AADT / HGV % Link 5: 3,080 / 13363 / 12 Link 14: 3,268 / 10558 / 14 Link 15: 3,302 / 12301 / 12 Link 40: 1,926 / 15271 / 10 Link 7: 2,796 / 10734 / 9	5%	~48	9
Option B	8	45	96	41	190	6	5	Length (m) / AADT / HGV % Link 11: 11,390 / 9,627 / 14 Link 12: 4,669 / 10,989 / 16 Link 13: 2,468 / 9,211 / 15	30%	~57	6
Option C	8	57	176	214	455	8	6	Length (m) / AADT / HGV % Link 14: 6,381 / 10,558 / 14 Link 15: 3,302 / 12,301 / 12 Link 40: 1,911 / 15,271 / 10 Link 16: 3,129 / 9,029 / 11	12%	~68	=7
Option Cv1	8	57	112	81	258	7	7	Length (m) / AADT / HGV % Link 14/39: 6,298 / 7,977 / 13 Link 18: 3,933 / 8,734 / 12 Link 19: 4,658 / 9,912 / 10	17%	~42	=7
Option Cv2	16	66	290	198	570	10	9	Length (m) / AADT / HGV % Link 14: 6,381 / 10,558 / 14 Link 15: 3,302 / 12,301 / 12 Link 40: 1,911 / 15,271 / 10 Link 16: 2,974 / 9,029 / 11	16%	~80	10
Option D	4	15	82	54	155	3	2	Length (m) / AADT / HGV % Link 17/20: 8,372 / 8,008 / 12 Link 18: 2,218 / 9,785 / 11	27%	~15	2

Stage 2 Options	0-50m	50-100m	100-200m	200-300m	PIR Sub-Total	PIR Rank 0 - 300m	PIR Rank 0 - 50m	AADT & Link Length				Percentage of Option in deep cutting (>2m)	Maximum number of properties potentially within 60 dB L_{den} contour	Overall Option Ranking
								Link 19	4,636	10,199	10			
Option Dv1	12	27	92	56	187	5	8		Length (m)	AADT	HGV %	25%	~17	5
								Link 17/20	8,552	8,008	12			
								Link 18	2,188	9,785	11			
								Link 19	4,636	10,199	10			
Option E	4	21	78	55	158	4	3		Length (m)	AADT	HGV %	14%	~22	4
								Link 17/20	7,004	7,801	12			
								Link 18	3,878	8,845	11			
								Link 19	4,608	9,816	11			
Option Ev1	4	18	74	56	152	2	4		Length (m)	AADT	HGV %	15%	~18	3
								Link 17/20	6,848	7,801	12			
								Link 18	3,878	8,845	11			
								Link 19	4,608	9,816	11			
Option Ev2	0	12	76	60	148	1	1		Length (m)	AADT	HGV %	20%	~15	1
								Link 17/20	7,004	7,801	12			
								Link 18	4,049	8,845	11			
								Link 19	4,636	9,816	11			

Based on the three elements of Option Selection outlined in "The TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes", including an assessment of potential impact rating (PIR) based upon property counts, a consideration of likely changes in traffic flow, and a review of the need for and difficulties associated with noise mitigation measures, has allowed for a determination of the best ranked option as outlined in Table 9-14.

Table 9-14 Stage 2 Noise and Vibration Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	1	Major or Highly Negative	Least Preferred	9
Option B	1	Major or Highly Negative	Least Preferred	6
Option C	1	Major or Highly Negative	Least Preferred	=7
Option Cv1	1	Major or Highly Negative	Least Preferred	=7
Option Cv2	1	Major or Highly Negative	Least Preferred	10
Option D	2	Moderately Negative	Intermediate	2
Option Dv1	2	Moderately Negative	Intermediate	5
Option E	2	Moderately Negative	Intermediate	4
Option Ev1	2	Moderately Negative	Intermediate	3
Option Ev2	2	Moderately Negative	Most Preferred	1

9.4.4 Landscape and Visual (Including Light)

JBA Consulting were commissioned to conduct Landscape and Visual assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 4 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

This document represents the Phase 2: Stage 2 – Project Appraisal Matrix – Assessment Working Paper for the N3 Virginia Bypass, Co. Cavan. The assessment is based on the recommendations in the Guidelines for Landscape and Visual Impact Assessment (GLVIA) as published by the Landscape Institute (UK) and the Institute of Environmental Management and Assessment (3rd Edition, 2013)[17], the guidelines from the Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document[18] and Proposed National Roads - Standard[19]. The assessment also considers the landscape character assessment within the Cavan County Development Plan 2014 – 2020, the draft Cavan County Development Plan 2022-2028 and the Meath County Development Plan 2021 – 2027.

To evaluate potential impacts to the existing landscape and visual amenity, this stage's assessment involved:

[17] Landscape Institute and Institute of Environmental Management & Assessment, 2013. *Guidelines for Landscape and Visual Impact Assessment 3rd Edition*. Routledge
[18] TII Publications, December 2020. *Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document*, PE-ENV-01101
[19] TII Publications, December 2020. *Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Proposed National Roads - Standard*, PE-ENV-01102

- A desktop study of the proposed corridor options to establish the baseline conditions and with a focus on impacted landscape designations, as well as environmental and heritage designations;
- A site and photographic survey to further determine any potential effects of the proposed corridor options and the degree to which these elements would be visible in the landscape;
- A desktop count of the impacted properties and assessment of the impact of the proposed corridor options to their views and amenity; and
- An overall assessment and ranking of the corridor options based on these criteria and the ranking system provided for the stage.

Impact on Setting

This assessment evaluates a site's sensitivity to the impacts of the proposed project on the landscape and the visual amenity. The criteria for the assessment are:

- Landscape Impact Assessment Criteria
  When assessing the potential impacts on the landscape resulting from the proposed project, the following criteria are considered:
  - Landscape character sensitivity; and
  - Magnitude of likely impacts
- Visual Impact Assessment Criteria
  When assessing the potential impacts on the visual amenity resulting from the proposed project, the following criteria are considered:
  - Visual receptor sensitivity; and
  - Magnitude of likely impacts.

Description of Impacts, Magnitude and Sensitivity

The EPA guidance document[20] also uses these standard definitions to describe the impact in terms of its quality, significance, extent, duration & frequency and type, where possible.

The TII document[21] specifies the criteria for assessing the magnitude of landscape and visual impacts and the criteria for assessing the sensitivity of visual receptors. These would be classified as being very high, high, medium, low or very low/negligible.

Deriving from this rating of visual sensitivity, for the purposes of this desktop-based assessment, the visual receptors within the Study Area have been put into four categories, from Category IV to Category I, from more sensitive receptors to less sensitive ones.

The significance of impacts is a function of visual receptor sensitivity and visual impact magnitude. The significance of an impact would be classified as being imperceptible, not significant, slight effects, moderate effects, significant effects and profound effects (Rationale behind ranking for each option).

[20] Environmental Protection Agency (August 2017) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Draft)*

[21] TII Publications, December 2020. *Landscape Character Assessment (LCA) and Landscape and Visual Impact Assessment (LVIA) of Specified Infrastructure Projects - Overarching Technical Document*, PE-ENV-01101

Assessment

The detailed landscape and visual assessment is presented in Section 4 of Volume 5 of Option Selection Report. A summary of landscape and visual receptors for each option is provided in Table 9-15 and Table 9-16 respectively.

Table 9-15 Stage 2 – Expected Number of Landscape Receptors

Stage 2 Options/ Sensitivity Category	IV	III	II	I
Option A	1	7	28	18
Option B	4	13	132	18
Option C	1	7	99	14
Option Cv1	1	4	90	12
Option Cv2	1	6	95	14
Option D	1	8	88	12
Option Dv1	1	8	85	11
Option E	1	9	90	11
Option Ev1	1	10	96	11
Option Ev2	1	9	100	11

Table 9-16 Stage 2 – Expected Number of Visual Receptors

Stage 2 Options/ Sensitivity Category	IV	III	II	I
Option A	47	100	546	76
Option B	44	30	159	66
Option C	52	140	588	82
Option Cv1	31	49	147	78
Option Cv2	42	184	602	86
Option D	18	55	126	54
Option Dv1	16	42	117	50
Option E	15	48	109	47
Option Ev1	15	57	116	47
Option Ev2	19	40	126	50

Results

All options would be expected to have an initial negative visual and landscape impact. All options would by large be introducing a dual carriage way in a rural setting and would appear to have a detrimental effect to segments of a number of landscape features, especially vegetation (hedgerows and trees) acting as field boundaries and part of riparian vegetation. Options that would not affect directly landscape and visual designations, in this case the high sensitivity LCA within County Meath, as well as ecological and cultural heritage designations, would be preferred over other options. When the impact on the amenity offered by elements of ecology and heritage is cumulatively taken into consideration, the overall negative effects would be expected to be locally significant and permanent. The incorporation of cuttings where the proposed route

options are on elevated grounds would reduce the visual impact in more sensitive locations, yet the sections of alignment on higher ground levels would be expected to significantly and adversely impact the visual amenity of the affected receptors, especially at night. Careful incorporation of mitigating planting and landscape features would be expected to further reduce the potential negative impact upon the visual amenity and landscape fabric.

The most preferred option would be Option D variant 1, on the basis that it combines a comparatively low number of potentially affected landscape and visual receptors, while maintaining a comparatively low height where the alignment would be on embankment. The second preferred option would be Option D following the same reasoning. The third preferred option would be Option E as it generally follows the principles of Options D and D variant 1 while having an expected greater visual exposure where it would be standing on an embankment. The least preferred option would be Option B as it appears to have the potential to affect the higher sensitivity LCA within County Meath including Loughcrew Cairns and a demesne, while it directly affects an ecological designation. The second least preferred options would be Option C variant 2 followed by the options using the Red route as it gets closer to the town of Virginia increasing in that way the number of potential visual receptors.

Table 9-17 Stage 2 Landscape and Visual Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	1	Major or Highly Negative	Least Preferred	8
Option B	1	Major or Highly Negative	Least Preferred	10
Option C	1	Major or Highly Negative	Intermediate	7
Option Cv1	1	Major or Highly Negative	Intermediate	6
Option Cv2	1	Major or Highly Negative	Least Preferred	9
Option D	2	Moderately Negative	Most Preferred	2
Option Dv1	2	Moderately Negative	Most Preferred	1
Option E	2	Moderately Negative	Most Preferred	3
Option Ev1	1	Major or Highly Negative	Intermediate	4
Option Ev2	1	Major or Highly Negative	Intermediate	5

9.4.5 Biodiversity – Flora and Fauna

EirEco Environmental Consultants were commissioned to conduct Biodiversity assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 5 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

An assessment was undertaken of the likely impacts of each of the 10 route corridor options on four categories of ecological parameters in accordance with the requirements of the NRA (now TII) Guidelines for Assessment of Ecological Impacts on National Road Schemes (June 2009) as follows:

1. Designated conservation areas (including European Sites and sites protected under National legislation);
2. General Ecology (terrestrial and aquatic habitats of high value identified in the constraints study);
3. Bats (including roosting, foraging and commuting habitats); and
4. Wintering and Breeding Birds (including winter foraging and roosting habitat, and breeding habitat).

Each parameter was assessed in relation to a potential zone of influence, which in the case of breeding species such as Barn Owl, will extend well beyond the actual footprint of the road. The zone of influence in wetland sites may extend well beyond the footprint of the proposed road, though the extent of impact would be dependent on the specific hydrology of the site and the approach taken to construction. Many of the wetland sites are areas of raised bog which have been drained, partially cutover or planted with coniferous woodland. In the case of watercourse crossings, the zone of influence will extend downstream, but the potential scale of impact would be dependent on the crossing type (clear-span or culvert, realignment required, etc.) and the mitigation applied. The assessment therefore considers the significance of the potential impact and the geographical level. The key ecological receptors identified along the various option corridors have been identified from desktop studies of existing databases covering designated conservation areas, identified habitats of biodiversity value (native woodlands, known / confirmed bat roosts, important bird areas, etc.), sites identified from a review of aerial imagery, and water course crossings.

Site surveys were undertaken using a combination of windscreen surveys and roadside views where possible. Following the desk-based review of available information on the habitats and species of conservation value found within the Study Area, a series of site visits were undertaken. The aim of these site visits was to view the ecological features of interest first hand, determine the likely interaction that each route may have on these habitats and to undertake a preliminary assessment of the potential impact each route may have on the identified habitats. Restricted field surveys were undertaken at key sites, features and route sections that were deemed to be of particular ecological value with the aim to assess the potential impacts of the routes upon them. Crossing points and points of interaction were visited for each of the routes and, where feasible, 'vantage point' surveys were undertaken in the form of visual inspections from strategic locations. Access to locations and habitats within the Study Area was restricted as permission to cross private and farmed lands had yet to be formalised.

Ecological sites within the study area have been evaluated and the scale of impact determined based on the criteria presented in Table 8-7. The levels of impact assigned to particular route corridor options make the assumption that general mitigation measures will be implemented. Each impact was scored based on TII's seven-point scale (PE-PAG-02031). The scoring reflects the number and significance of ecological receptors impacted by each route corridor option.

The evaluation of the key ecological receptors and the criteria used to assess the significance of impacts are derived from the *Guidelines for Assessment of Ecological Impacts on National Road Schemes* (TII, June 2009) (the "TII Guidelines"), *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (EPA, Draft August 2017) (the "EPA Guidelines") and the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (CIEEM, 2018) (the "CIEEM Guidelines").

Assessment

A summary of impacts on four ecological parameters, discussed above, for each option is presented in Table 9-18. The detailed assessment is presented in Section 5 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Table 9-18 Assessment of Options with regards to various Ecological Parameters

Options	Impacts on Designated Areas for Conservation	Impacts on Ecological Sites (refer to Table 9-19 for site details)	Impacts on Bat roosts or habitat	Impacts on Wintering or Breeding Birds
Option A	No direct impact	Sites 6, 9, 10, 11, 27, 32 and 34 1 major and 13 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds

Option B	Crossing River Boyne and River Blackwater SAC & SPA	Site 6, 35, 36, 39, 40 and 49 1 major and 15 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option C	No direct impact	Sites 6, 9, 10, 11, 26, 27, 32 and 34 3 major and 14 minor watercourses	Within 200m of bat box scheme. All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option Cv1	No direct impact	Site 6, 12, 19, 26, 27, 32, 33 and 53 1 major and 10 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option Cv2	No direct impact	Site 6, 9, 10, 11, 26, 27, 32 and 34 1 major and 14 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option D	No direct impact	Sites 6, 12, 19, 25, 33 and 53 1 major and 15 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option Dv1	No direct impact	Sites 6, 12, 19, 25, 33 and 53 1 major and 11 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option E	No direct impact	Sites 6, 12, 18, 25 and 53 1 major and 15 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option Ev1	No direct impact	Sites 6, 12, 18, 25 and 53 1 major and 19 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds
Option Ev2	No direct impact	Sites 6, 12, 25, 33 and 53 1 major and 13 minor watercourses	All sites and watercourses likely to be important for bats	All sites and watercourses likely to be important for breeding birds

Table 9-19 Ecological Sites Impacted by Stage 2 Options

Site No.*	Site Name	Description	Evaluation (As per Table 8-7)
6	Drumagolan, Correagh	Deciduous woodland (possibly on peat).	D/C
9	Lisgrea Lough	Woodland and scrub around lake. (Irish Wetlands WMI_CN301)	C
10	Cornaslieve Lough, Crannadillon	Woodland plantation around lake. (Irish Wetlands WMI_CN302)	C

11	Crannadillon	Blocks of deciduous woodland either side of N3	D
12	Lisnabantry Bog	Cutover raised bog with fringing woodland and scrub. (Irish Wetlands WMI_CN78)	C
18	Drumrat / Corfad Bog	Intact raised bog with fringing woodland on east side. (Irish Wetlands WMI_CN298)	B
19	Cloghergoole, Lislea Bog	Raised bog partially cutover in two blocks with surrounding conifer plantation. (Irish Wetlands WMI_CN289)	D/C
25	Fartagh	Wet grassland (possibly bog) with scrub mosaic.	D
26	Enagh Bog	Relict raised bog with extensive woodland. (Irish Wetlands WMI_CN283)	D/C
27	Edenburt	Pond / flooded area in grassland – possibly wet.	D
32	Burrencarragh	Deciduous woodland.	D/C
33	Cornashesk	Mixed woodland / heath mosaic – possibly on peat.	D
34	Curracloghan Bog	Relict raised bog with extensive woodland / scrub. (Irish Wetlands WMI_CN299)	D/C
35	Pottlereagh	Flood area with surrounding scrub and wet grassland mosaic – partially within SPA but may be quarried.	D(A)
36	Ballaghdorragh, Moate	River valley with woodland and scrub.	D
39	Ballaghdorragh	Network of mature treelines and hedgerows.	D
40	Behernagh Bog	Relict raised bog with extensive woodland / scrub. (Wetlands Ireland WMI_CN282)	D/C
49	Correagh Glebe	Linear belt of possibly alluvial woodland along stream corridor.	D/C
53	Lisnabantry West and East	Two areas mosaic wet grassland, scrub, bog / fen. (Irish Wetlands WMI_CN559 / WMI_CN560)	D/C

*As shown in Constraints Drawings

Results

The overall ranking for each category for the 10 route corridor options is presented in Table 9-20 below. The rationale for the ranking is based on the summarised assessment for each of the corridor options as presented above. Table 9-21 presents a summary preference ranking for the 10 corridor options for Biodiversity based on the scoring across all ecological parameters.

Table 9-20 Scoring for Options for Various Ecological Parameters

Stage 2 Options	Designated Conservation Areas	General Ecology	Bats	Breeding and wintering birds	Overall Impact Score
Option A	3	2	2	3	3
Option B	1	1	1	1	1
Option C	3	1	1	1	1
Option Cv1	3	2	2	2	2
Option Cv2	3	2	2	2	2
Option D	3	2	2	2	2
Option Dv1	3	2	2	2	2
Option E	3	1	1	2	1
Option Ev1	3	1	1	2	1
Option Ev2	3	2	2	2	2

Table 9-21 Stage 2 Biodiversity Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	3	Minor or Slightly Negative	Preferred	1
Option B	1	Major or Highly Negative	Least preferred	3
Option C	1	Major or Highly Negative	Least preferred	3
Option Cv1	2	Moderately Negative	Intermediate	2
Option Cv2	2	Moderately Negative	Intermediate	2
Option D	2	Moderately Negative	Intermediate	2
Option Dv1	2	Moderately Negative	Intermediate	2
Option E	1	Major or Highly Negative	Least preferred	3
Option Ev1	1	Major or Highly Negative	Least preferred	3
Option Ev2	2	Moderately Negative	Intermediate	2

9.4.6 Waste

Barry Transportation conducted the Waste assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 6 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

Waste is defined under Section 4(1) of the Waste Management Act 1996 (as amended) as any substance or object which the holder discards or intends or is required to discard. In terms of a road construction project, most naturally occurring materials excavated as part of the works will not be considered a waste as they can be re-used within the works to ensure that where feasible, that the quantities excavated from a project match the requirements for the construction of embankments and other landscaping elements. There are three broad types of excavated material as set out in TII's Specification for Works Series 600 – Earthworks (as detailed below):

- Acceptable material: material excavated from within the site or imported on to the site which meets the requirements of the specification for acceptability for use in the works;
- Unacceptable material Class U1: material excavated from within the site which, unless processed so that it meets the requirements of the specification for acceptable material will not be used in the works;
- Unacceptable material Class U2: material having hazardous chemical or physical properties requiring special measures for its excavation, handling, storing, transportation, deposition and disposal. Class U2 material excavated from within the site will not be used in the works unless processed so that it meets the requirements of the specification for acceptable material.

Acceptable excavated material that is not surplus to requirements will be re-used in the works for engineering purposes including fill to embankments, landscaping, etc. Acceptable material that is surplus to requirements will be used in spoil heaps on-site or at off-site locations, subject to proper approvals.

Unsuitable materials are considered to comprise of either soft ground (such as bog, marsh and alluvium), or contaminated material. Areas of soft ground have been assessed separately in Section 7 Soils and Geology. Alluvial deposits and lacustrine sediments are shown in mapping to be present locally and are generally related to watercourses within the study area. There are widespread areas of peat to the north east of Lough Ramor. Potentially contaminated sites include legacy landfills, waste licensed sites, and pits & quarries. Other potential sources of contamination include cemeteries, older buildings, commercial sites, electrical substations and service stations around the study area.

Unsuitable or waste material that is too poor to be reused in construction requires removal and disposal or alternative methods for improvement such as piling or ground stabilisation. An assessment of waste materials to be taken to spoil sites or disposed of on-site was undertaken based on the amount of general excavation requirements and poor ground likely to be intercepted by each of the route corridor options.

Both Class U1 and Class U2 material may be processed by mechanical, chemical or other means to render the material acceptable for use in the works. It is possible that some unacceptable material may become a waste if disposal of the material is required.

All excavated material from the site of the proposed road will be managed in accordance with best practice to ensure in so far as possible that there is minimal waste generated.

Any excavated contaminated material will fall under Class U2 and must be removed off-site for disposal at an authorised waste management facility. Currently, there is no indication of contaminated material being present within the footprint of the options.

Where there is a deficit of fill material for the construction of the project then acceptable soil and stone must be imported from other sources to make up the shortfall. This has the effect of requiring the use of fill material from quarries or borrow pits outside of the site boundary or the importation of inert waste fill material that has been re-classified as a by-product and which meets the specification for acceptable material. Production, processing and transporting of material to make up the deficit could have a significant environmental impact in terms of traffic movements, greenhouse gas emissions, use of valuable raw materials, etc.

At this stage in the project approximately estimates of the likely quantities of waste that will be generated from the works have been made. For each option, a preliminary vertical alignment was designed based on the available information on constraints as well as crossings over or under the existing road network. From this a preliminary cut / fill analysis was undertaken, which indicated a requirement of fill material to be brought in for all of the options. therefore it is considered that none of the options will generate a cut volume for disposal as waste. This will be further evaluated and assessed during the next phase.

The following assumptions were used for the calculation of the waste volumes:

- With regard to general excavated material, it is assumed that 60% will be acceptable material, 20% will be suitable after treatment and the remaining 20% will be unsuitable (U1).
- For the peat & other soft soils information on soft soils from the Geological Survey of Ireland was overlaid on the preliminary alignments for each option. Average depths of soft soils for each distinct area were estimated using the data from the preliminary GI contract. A factor of safety for soft soil depth was added for each option. The assumed average depths range from 0.5m for Option B to 2.5m for Option Dv1.
- An assumption has been made that 20% of the sum of the unsuitable excavated material and the soft soil will need to be disposed of off-site, with the remainder disposed of within the site and/or reused.

A summary of each option and the impacts in terms of waste appraisal is provided in Table 9-22 below.

Table 9-22 Waste Appraisal of Corridor Options

Stage 2 Options	General import (m^3)	Surplus material (m^3)	Total Unsuitable Material* for Disposal offsite (m^3)	Total Material for Reuse/recycle on Site (m^3)
Option A	1,439,444	515,988	103,698	412,790
Option B	1,062,530	348,922	70,284	279,138
Option C	1,801,228	800,361	160,572	640,289
Option Cv1	2,124,774	895,425	179,585	716,340
Option Cv2	2,365,959	635,488	127,598	508,391
Option D	937,252	924,804	185,461	739,843
Option Dv1	1,722,834	937,755	188,051	750,204
Option E	1,623,365	641,533	128,807	513,227
Option Ev1	1,353,802	663,977	133,295	531,181
Option Ev2	1,159,577	669,459	134,392	535,568
*	**Total Unsuitable Material for Disposal/Treatment offsite (m^3) predominantly comprises estimates of materials that deemed a waste under Section 4(1) of the Waste Management Act 1996 (as amended)**			

Results

The assessments as detailed above in Table 9-22 regarding Total Unsuitable Material for Disposal Offsite (m^3) inform the assessment as detailed below in Table 9-23.

Table 9-23 Stage 2 Waste Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	3	Minor or Slightly Negative	Most Preferred	2
Option B	3	Minor or Slightly Negative	Most Preferred	1
Option C	2	Moderately Negative	Least preferred	7
Option Cv1	2	Moderately Negative	Least preferred	8
Option Cv2	3	Minor or Slightly Negative	Intermediate	3
Option D	2	Moderately Negative	Least preferred	9
Option Dv1	2	Moderately Negative	Least preferred	10
Option E	2	Moderately Negative	Intermediate	4
Option Ev1	2	Moderately Negative	Intermediate	5
Option Ev2	2	Moderately Negative	Intermediate	6

9.4.7 Soils and Geology

Barry Transportation conducted the Soils and Geology assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 7 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

The TII Publications PE-PAG-02031 *Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis* (2016) and the NRA *Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes* (2009) have been complied within this assessment.

The impacts on Soils & Geology were assessed using the metrics identified in Table 9-24. These are based on the constraints identified in the Constraints Report. The information necessary to determine the level of impact on each metric has been compiled from a desk study assessment of the published information available from the following sources;

- Geological Survey of Ireland's (GSI's) online mapping portal (https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx);
- Environmental Protection Agency's (EPA's) online environmental data portal (https://gis.epa.ie/EPAMaps/); and
- GeoHive spatial data mapping (http://map.geohive.ie/).

Information necessary to the assessment was also collected during the following field works:

- *N3 Virginia Bypass – Ground Investigation* Report no. 21-0567 by Causeway Geotech Ltd. to Barry Transportation on behalf of Cavan County Council.

Metrics were assessed quantitatively (where possible) and qualitatively. Quantitative analysis involved counting the number of features present, while qualitative analysis involved the consideration of the type of feature, the interactions between different metrics, and their potential impacts on the proposed development. Both analyses included consideration of features outside of the route corridors, provided these could still impact the proposed development. All metrics were weighted on a scale of 1 – 10 based on how critically they were perceived to impact on the proposed development with higher metric weightings given to more critical metrics i.e., 1 being non-critical and 10 being the most critical.

Where the proposed Corridor Options pass in close proximity to Geological Heritage sites within the Study Area, the GSI were also invited to give feedback on any potential impacts (both positive and negative) to these sites. Details of the proposed corridors were provided on 19th May 2021 and a response was received on 3rd June 2021. This was taken into account in the assessment of Soils & Geology.

Each Corridor Option was assessed as a whole, with the impacts on each node-to-node section weighted against their respective percentage lengths. Corridor Options were assigned an Impact Score, as per the 7-point scale in Section 2.4 of PE-PAG-02031 (TII, 2016).

Corridor Options were then designated as *"Most Preferred"* (green), *"Intermediate Preferred"* (orange), or *"Least Preferred"* (red). It should be noted that the Impact Scores of each option were not directly utilised in choosing Corridor Option preferences but were considered alongside the significance of individual metrics.

Table 9-24 below identifies the Soils & Geology metrics assessed and their respective impact weightings.

Table 9-24 Soils & Geology – Metrics and Impact Weightings

Metric		Assessment	Impact Weighting
Solid Geology	Bedrock Geology	Qualitative	0
Soils	Soft Soils	Quantitative & Qualitative	10
Geomorphology	Landslide Susceptibility	Qualitative	4
Karst	Karst Features	Quantitative & Qualitative	0

Metric		Assessment	Impact Weighting
Economic Geology	Pits & Quarries	Quantitative & Qualitative	2
	Aggregate Potential – Resource Sterilisation	Qualitative	2
	Aggregate Potential – Resource Reusability	Qualitative	1
Contaminated Land	Landfills & Contaminated Sites	Quantitative & Qualitative	2
	IPPC Licensed Facilities	Quantitative & Qualitative	0
Geological Heritage	Audited & Unaudited Geological Heritage Sites	Quantitative & Qualitative	4

Assessment

Solid Geology

A qualitative assessment of the different bedrock geology units underlying each corridor option was conducted. Most bedrock units have similar compositions of sandstone and sedimentary conglomerates. The limestones of the Meath Formation are noted as sandy and interbedded with siltstones. Furthermore, only a small section of Option B overlies this formation. Therefore, an impact weighting of 0 (Table 9-24) was applied as no significant difference between corridor options is anticipated.

Soils

A quantitative assessment of the length of each option over soft soils, followed by a qualitative assessment of the different materials and their potential impacts was conducted. Materials assessed as soft soils included peat; alluvium; and lacustrine sediments. This assessment is based on results obtained from the preliminary site investigation which targeted areas of soft soils identified by GSI mapping of Quaternary sediments. An impact weighting of 10 (Table 9-24) was applied as soft soils is the most critical metric assessed for this scheme and should be avoided wherever possible.

Geomorphology

A qualitative assessment of the landslide susceptibility within and surrounding each corridor option, focused on areas of moderately high landslide susceptibility was conducted. While there are areas of high landslide susceptibility within the Study Area, none of these have the potential to impact on any of the corridor options being assessed. Areas of landslide susceptibility upslope of the proposed development were assessed as the most critical, while areas associated with rivers were not assessed as critically as these will in all likelihood be bridged. An impact weighting of 4 (Table 9-24) was applied as areas of landslide susceptibility are difficult to design around and ought to be avoided where possible.

Karst

A quantitative assessment was conducted of the number of recorded karst features within and in close proximity to each corridor option, followed by a qualitative assessment of the feature type, potential impacts on the proposed development and the potential for unrecorded karst features. An impact weighting of 0 (Table 9-24) was applied as there are no known karst features within the Study Area.

Economic Geology

A quantitative assessment of the number of pits & quarries within and in close proximity to each corridor option, followed by a qualitative assessment of the potential impacts either on the proposed development

or the pit/quarry was conducted. Positive impacts include the facility providing a nearby source of materials, while negative impacts include sterilisation of the resource, i.e. the continued operation (or reactivation) of the facility could be limited and/or prevented by the proposed development. An impact weighting of 2 was applied as pits & quarries are predominantly avoided by the corridor options.

A qualitative assessment of the aggregate potential focused on areas of moderate to very high potential was also conducted. Developments can have both negative and positive impacts on aggregate potential that are not necessarily related;

- Resource sterilisation, whereby the proposed development limits and/or prevents the future development of potential resources (negative); and
- Resource reusability, whereby proposed cuttings are more likely to produce high volumes of reusable material (positive).

An impact weighting of 2 was applied to resource sterilisation as this will have a greater impact on areas where historic or active pits and quarries are present. An impact weighting of 1 was applied to aggregate reusability as this is largely associated with the bedrock geology, which as discussed above, is not expected to differ significantly between corridor options.

Contaminated Land

A quantitative assessment of the number of potentially contaminated sites within and in close proximity to each corridor option, followed by a qualitative assessment of the potential type and extent of contamination was conducted. Potentially contaminated sites include legacy landfills, waste licensed sites, and pits & quarries. This assessment was limited to sites known to the EPA and the relevant local authorities. No potential sites have been identified that may change the results of this assessment. An impact weighting of 2 was applied as potentially contaminated sites assessed are limited to historic pits & quarries which are predominantly avoided by the corridor options.

A quantitative assessment was also conducted of the number of IPPC Licensed facilities within each route corridor, followed by a qualitative assessment of any potential for associated soil contamination. An impact weighting of 0 was applied as all corridor options avoid entering IPPC Licensed facilities

Geological Heritage

A quantitative assessment was conducted of the number of audited and unaudited geological heritage sites within and in close proximity to each corridor option, followed by a qualitative assessment of the type of site and potential impact from the proposed development. It is important to note that not all impacts on geological heritage are negative as the additional public exposure can often enhance the value of a heritage site. An impact weighting of 4 was applied as nearly all corridor options pass within close proximity to geological heritage sites, though the anticipated impacts are typically minor.

Results

Corridor Options were assigned an Impact Score and designated as *"Most Preferred"* (green), *"Intermediate"* (orange), or *"Least Preferred"* (red). Rankings were also assigned to distinguish between the levels of preference.

Table 9-25 Stage 2 Soils and Geology Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Ranking
Option A	3	Minor or Slightly Negative	Most Preferred	1
Option B	3	Minor or Slightly Negative	Intermediate	3
Option C	3	Minor or Slightly Negative	Most Preferred	2
Option Cv1	2	Moderately Negative	Least Preferred	6
Option Cv2	3	Minor or Slightly Negative	Intermediate	4
Option D	2	Moderately Negative	Least Preferred	10
Option Dv1	2	Moderately Negative	Least Preferred	8
Option E	2	Moderately Negative	Least Preferred	7
Option Ev1	2	Moderately Negative	Least Preferred	9
Option Ev2	3	Minor or Slightly Negative	Most Preferred	5

9.4.8 Hydrology

Barry Transportation conducted the Hydrology assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 8 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

The hydrology assessment was developed in accordance with the TII Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes and the TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (Document Ref PE-PAG-02031-October 2016). A comparative evaluation of the options was undertaken, having regard to the specific hydrological impacts associated with each option in order to identify a preferred option(s).

A total of 10 No. options were assessed. The details of the assessment are outlined below. The impact to sites of ecological interest were not assessed as these have been addressed in Section 9.4.5.

This assessment was carried out further to a review of all the available information on the study area. The sources of information have been listed below.

- Aerial photography and mapping of study area (GSI, OSI and online sources);
- Environmental Protection Agency online mapping. (https://gis.epa.ie/EPAMaps);
- Environmental Protection Agency, (website www.epa.ie) – water quality data;
- Environmental Protection Agency, (website www.catchments.ie) – watercourse catchment and subcatchment data;
- Office of Public Works Historical Flood Reports and National Indicative Fluvial Mapping (Website www.floodinfo.ie);
- Interactive CFRAM Mapping https://www.floodinfo.ie/map/floodmaps/ ; and
- Catchment Science & Management Unit Environmental Protection Agency – Boyne Catchment Assessment 2010-2015.

In accordance with Paragraph 2.4 of PE-PAG-02031, an assessment has been made of the impact each option corridor has on the existing hydrological regime within the catchment. The assessment considers the crossing of watercourses by the mainline only. Where the option corridor crosses a watercourse, and there is a likelihood that a parallel access road is required (for example an online upgrade), they have been

assessed as a single crossing. As part of the assessment the numbers and severity of each impact has been recorded.

It should be noted that it is difficult to predict how each proposed option will impact the predicted flood extents and surrounding lands without detailed hydraulic modelling. The assessment of the areas of flood water encroached upon by the proposed option corridors serves as a preliminary indication as to which option would be more favourable from a hydrological viewpoint. Options where a flood plain is encroached upon by the road causing loss of storage volume, will be scored more severely. Mitigation measures may involve works such as providing compensation storage, using wider spanned bridges, or providing additional infrastructure to continue flow across the proposed road, to maintain the existing flood regime.

In the tables each impact has been assigned an impact rating from 1 to 7, with 1 being Major or Highly Negative and 7 being Major or Highly Positive. Based on the assessment procedure described above and the results of the qualitative and quantitative assessment preferences from 1 to 3 were assigned to the options.

All road crossings of watercourses require discharge of surface water runoff from the proposed road surfaces. Consequently, they are considered to have a negative impact on water quality, with the impacts severity generally based on the sensitivity and importance of the watercourse. Where a minor stream is crossed this was given a rating of 3 ‘Minor or Slightly Negative’. Where larger systems such as the Lislea, Pollintemple, Crannadillon and Lough Nadreegeel Stream were crossed, the impact was given a scoring of 2 ‘Moderately Negative’. The crossings of the River Blackwater upstream of Lough Ramor and Virginia are assigned a rating of 2 also, by virtue of the distance to the SAC and the dilution factor from Lough Ramor.

Where the option crosses the Boyne Blackwater SAC, the impact is rated as 1 ‘Highly Negative.’ Where there is a crossing of the watercourses directly discharging into the SAC, such as the Cross Water, Pottlereagh and Stramatt, the impact was also given a scoring of 1 ‘Highly Negative’. Where a diversion of a watercourse is required, the option was also given a score of 1 ‘Major or Highly Negative’. In situations where a flood plain is encroached upon, the option is given a score of 2 ‘Moderately Negative’ or 3 ‘Minor Negative’, depending on whether mitigation measures are likely to be required. Where an option crosses a flood plain more than once, each crossing is listed and given a score.

It should also be noted that the existing drainage network is a legacy system with little or no capacity to provide pollution control, for example in the event of an accident or spillage. Regardless of the option chosen, the drainage network that will be provided for the scheme will include a positive drainage system with sustainable drainage systems (SUDs) and pollution controls, and facilitate an improvement in the water quality in the local watercourse network. In view of this, the overall rating of each of the options has been improved by a rating of 1.

Assessment

Relevant Water Framework Directive Catchments

All of the proposed options are contained within the Boyne Catchment (HA 07). They pass, variously, through the Blackwater WFD (Water Framework Directive) sub catchments SC_010, SC_020 and SC_030. The main surface water features potentially impacted by the option corridors are the Blackwater River and its tributaries, the Nadreegeel Lough Stream (Dunancory River) and the Lislea River. Other minor streams and watercourses, which are not identified on the EPA mapping and therefore have no EPA name or reference, are crossed by some of the options. These are considered to be minor streams.

Existing Watercourse Network

The proposed option corridors have the potential to affect a number of named river systems, as listed below. The naming convention and WFD codes have been obtained from the EPA website. Further details for these

river systems are presented in Section 8 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

- Blackwater (Kells) (WFD code: IE_EA_07B010800 / IE_EA_07B011100)
- Cross Water (WFD code: IE_EA_07C020930)
- Pottlereagh 07 (WFD code: IE_EA_07B011100)
- Pollintemple (WFD code: IE_EA_07B011000)
- Cornakilly (WFD code: IE_EA_07B011000)
- Aghalion (WFD code: IE_EA_07B011000)
- Aghacashel (WFD code: IE_EA_07B011000)
- Keelagh Glebe (WFD code: IE_EA_07B011000)
- Curraghkeel (WFD code: IE_EA_07N010500)
- Crannadillon (WFD code: IE_EA_07N010500)
- Correagh Glebe (WFD code: IE_EA_07N010500)
- Nadreegeel Lough (Stream) (WFD code: IE_EA_07N010500)
- Fartagh (WFD code: IE_EA_07B011100)
- Edenburt (WFD code: IE_EA_07B011100)
- Stramatt (WFD code: IE_EA_07B011100)
- Lislea 07 (WFD code: IE_EA_07L010100)
- Rahardrum (WFD code: IE_EA_07B011000)
- Murmod (WFD code: IE_EA_07B010800)
- Cornaslieve 07 (WFD code: IE_EA_07B010800)
- Lisgrea (WFD code: IE_EA_07N010500)
- Corraneden (WFD code: IE_EA_07B010800)
- Derver (WFD code: IE_EA_07B011100)
- Cloghbally Lower (WFD code: IE_EA_07L010100)
- Cloghergoole (WFD code: IE_EA_07L010100)
- Raffony (WFD code: IE_EA_07L010100)

EPA Water Quality Monitoring

Biological water quality monitoring of rivers and streams across Ireland is carried out by the EPA using the Q-rating system. This rating system is used to monitor the ecological quality of rivers and streams using the macro-invertebrate communities within the river/stream channel. The EPA website was referenced when collating the status and Q-Values of the watercourses.

A road which crosses a watercourse has the potential to negatively affect the water quality during both the construction and operational phases of the project. During the construction phase, when the bridge and any instream works are being carried out, there is the possibility of disturbance to the river bed and an associated increase in the quantity of silt in the water. There is also the possibility of fuel, silt and other pollutants from the site itself being washed into the river. When the road is operational, the pipe networks which provide drainage to the road's pavement, subbase and cuttings will outfall to existing watercourses, meaning that at each road crossing of a watercourse there will typically be 1-2 outfalls. Mitigation works at these outfalls in the form of attenuation ponds, spillage containment bays and emergency shut off valves will reduce the risk to watercourses water quality, but a residual risk to the water quality will always remain. As such, all road crossings of watercourses are considered to have a negative impact on water quality, the impacts severity generally based on the sensitivity and importance of the watercourse.

Flooding

The OPW website including the National Indicative Fluvial Maps (NIFM), Catchment Flood Risk Assessment and Management (CFRAM) website, and GSI Groundwater Flooding Data Viewer were consulted to identify flood sensitive locations. Cavan County Council also provided information on extents of previous flooding events.

Results

The majority of the impacts are at locations where the options cross existing watercourses. The impact scores assigned to the crossing points were based on the overall impact the road project will have throughout its construction and maintenance phase. As described above, a bridge crossing, culvert crossing, or culvert diversion of an existing watercourse has the potential to impact both the existing flow and flood regime along with the water quality. The impact scores on watercourses are based on these considerations.

It should also be noted that the existing drainage network is a legacy system with little or no capacity to provide pollution control, for example in the event of an accident or spillage. Regardless of the option chosen, the drainage network that will be provided for the scheme will include a positive drainage system with sustainable drainage systems (SUDs) and pollution controls. Transfer of traffic to a road with a positive drainage network will facilitate an improvement in the water quality in the local watercourse network.

Option A crosses the Lislea River south of Virginia and the Blackwater River north of Virginia. The Ballyjamesduff Link Road associated with the option crosses the Nadreegeel Lough Stream to the northwest of Virginia. The option also crosses the Pottlereagh and Stramatt watercourses, which both flow directly into the Blackwater SAC south of Lough Ramor. The option crosses nine minor watercourses. The option crosses areas of flood plain associated with the Lislea, Blackwater and Nadreegeel Lough Stream systems, with the latter being the most significant.

Option B crosses the Blackwater SAC near the existing N3/R147 roundabout, where the scheme would also require a drainage outfall. In addition, the option crosses two watercourses that discharge into the SAC, namely the Pottlereagh and Cross Water. The option also crosses the Pollintemple, Crannadillon and Nadreegeel Lough Stream watercourses, along with nine minor watercourses. The option will also require the diversion of the channels of 2 watercourses, an unnamed watercourse and the Aghalion watercourse. The option crosses areas of flood plain associated with the Blackwater, Cross Water, Cornakilly and Nadreegeel Lough Stream systems, along with another unnamed watercourse.

Option C crosses the Lislea River south of Virginia and the Blackwater River three times north of Virginia. The Ballyjamesduff Link Road associated with the option crosses the Nadreegeel Lough Stream to the northwest of Virginia. The option crosses twelve minor watercourses. The option crosses areas of flood plain associated with the Lislea, Blackwater (3 separate flood plains affected) and Nadreegeel Lough Stream systems.

Option Cv1 crosses the Lislea River south of Virginia and the Blackwater River and Corraneden watercourse north of Virginia. The option crosses seven minor watercourses. The option crosses areas of flood plain associated with the Lislea (2 separate flood plains affected) and Blackwater systems.

Option Cv2 crosses the Lislea River south of Virginia and the Blackwater River north of Virginia. The Ballyjamesduff Link Road associated with the option crosses the Nadreegeel Lough Stream to the northwest of Virginia. The option crosses twelve minor watercourses. The option crosses areas of flood plain associated with the Lislea, Blackwater, Lisgrea and Nadreegeel Lough Stream systems.

Option D crosses the Cloghbally Lower watercourse, Lislea River and Cloghergoole watercourse south of Virginia and the Blackwater River and Corraneden watercourse north of Virginia. The option crosses ten other minor watercourses. The option crosses areas of flood plain associated with the Cloghbally Lower, Lislea and Blackwater systems.

Option Dv1 crosses the Cloghbally Lower watercourse, Lislea River and Cloghergoole watercourse south of Virginia and the Blackwater River and Corraneden watercourse north of Virginia. The option crosses six other minor watercourses. The option crosses areas of flood plain associated with the Lislea and Blackwater systems.

Option E crosses the Cloghbally Lower watercourse, Lislea River and Cloghergoole watercourse south of Virginia and the Blackwater River and Corraneden watercourse north of Virginia. The option crosses nine other minor watercourses. The option crosses areas of flood plain associated with the Lislea and Blackwater systems.

Option Ev1 crosses the Cloghbally Lower watercourse, Lislea River and Cloghergoole watercourse south of Virginia and the Blackwater River and Corraneden watercourse north of Virginia. The option crosses thirteen other minor watercourses. The option will require the diversion of a watercourse which forms part of the Lislea River system. It crosses areas of flood plain associated with the Cloghbally Lower, Lislea and Blackwater systems.

Option Ev2 crosses the Cloghbally Lower watercourse, Lislea River and Cloghergoole watercourse south of Virginia and the Blackwater River and Corraneden watercourse north of Virginia. The option crosses six other minor watercourses. The option crosses areas of flood plain associated with the Lislea and Blackwater systems.

Option Cv1 is the most preferred option. It crosses the Blackwater just once, and it would have a limited effect on the flood plain at the crossing point. It does not cross the Nadreegeel Lough Stream or its flood plain. It has the fewest number of watercourse crossings overall. Option Ev2 would be the next most preferred option, followed by Option Dv1. Options Cv2 and D would be the next most preferred.

Option C would be the next most preferred option. The option corridor crosses the Blackwater River and its associated flood plain three times upstream of Virginia. In addition, a link road crosses the Nadreegeel Lough Stream and encroaches on its flood plain. Options E and Ev1 are the next most preferred. They each have one crossing of the Blackwater River, but both options would involve a diversion of a watercourse. Option A is the second least preferred option. Option B has the highest overall negative impact on the existing drainage regime and so is least preferred.

Table 9-26 Stage 2 Hydrology Assessment Summary

Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	2	Moderately Negative	Least Preferred	9
Option B	2	Moderately Negative	Least Preferred	10
Option C	3	Minor or Slightly Negative	Intermediate	6
Option Cv1	4	Neutral	Most Preferred	1
Option Cv2	3	Minor or Slightly Negative	Most Preferred	4
Option D	4	Neutral	Most Preferred	5
Option Dv1	4	Neutral	Most Preferred	3
Option E	3	Minor or Slightly Negative	Intermediate	7
Option Ev1	3	Minor or Slightly Negative	Intermediate	8
Option Ev2	4	Neutral	Most Preferred	2

9.4.9 Hydrogeology

Barry Transportation conducted the Hydrogeology assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 9 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

This assessment involves a desk study collating the hydrogeological information available for the selected corridor options. Information on the hydrogeology was obtained from the following sources:

- Geological Survey of Ireland (GSI) geological and hydrogeological data including online maps (www.gsi.ie).
- Irish Soil Information System Online Maps (http://gis.teagasc.ie/soils/map.php).
- Aerial Photography (OSI, Google Maps Imagery, BING Maps).
- CORINE (2012) Land Cover Mapping.
- County Cavan Groundwater Protection Scheme Reports (GSI, 2008)
- National Federation of Group Water Schemes (https://nfgws.ie/wp-content/uploads/2020/07/gws-map.html).
- Road Drainage and Water Environment DN-DNG-03065 (Historical Reference NRA HD45) (TII, 2015).

Each of the corridor options was assessed in relation to:

- Karst features.
- The classification of the underlying aquifer.
- The vulnerability of the underlying aquifer.
- The proximity to public groundwater supplies (within 500 metres) and the associated risk.
- The risk to groundwater dependant terrestrial ecosystems (GWDTE).
- The extent of cuttings greater than 5m in depth and their hydrogeological context.

The overall preferred corridor option selection is a combination of the above assessments.

Risk is a combination of the assessment of the presence of a sensitive receptor (groundwater abstraction, groundwater fed water bodies etc.) the pathway (proximity, vulnerability etc.) by which the receptor can be affected, and this presence of a risk itself.

This assessment assigns an Impact Score, from 1 to 7 for each of the corridor options in relation to the aforementioned criteria as per TII Guidance, *Project Appraisal Guidelines for National Roads Unit 7.0 Multi Criteria Analysis* (TII, 2016).

Assessment

Karst Features

There are no karst features present within 500m of any of the corridor options therefore, this criterion was not assessed further.

Aquifer Classification

The Study Area is majorly underlain by PI, poor bedrock aquifer that is generally unproductive except for local zones. A small portion of the corridor Option B also passes through Lm, locally important aquifer that is generally moderately productive and LI, locally important aquifer that is moderately productive only in local zones. Corridor option B is also underlain by a very small proportion of Lg, locally important gravel aquifer. For these reasons, Option B is considered least preferable in terms of aquifer classification.

Groundwater Vulnerability

The GSI have developed a system to classify aquifer vulnerability. All corridor options are underlain by a mix of Rock near surface/ karst aquifers (Extreme X), Extreme, High, Moderate and Low vulnerability. The former three classifications, Extreme X, Extreme and High are considered negative. At areas of the corridor options where there are proposed cuts on these classified areas the vulnerability will be increased.

There will be no direct discharges to groundwater associated with the proposed road design. However, the transportation of potentially hazardous materials which can be released in the event of an accident is a risk that results from the construction of the road. It should be noted however that the existing road network constitutes a similar risk to the groundwater in the event of an accident, spill or leakage. During the construction phase accidental spillages may impact on the groundwater quality within the aquifer.

Groundwater Supplies

Groundwater supplies refer to any large springs, holy wells, and groundwater abstractions for Local Authorities, commercial, industrial, or Group Water Schemes. There are no public and group scheme groundwater abstractions (and consequently no Source Protection Areas) within the Study Area. All corridor options are hence given a Neutral impact score under this criterion as there is nothing to distinguish these options from each other within this criterion. Private domestic wells were not assessed at the option selection stage.

Cuttings

Roads constructed in deep cuttings can impact on the groundwater by causing dewatering of the groundwater in the vicinity. The deeper the cutting the more significant and more extensive the impact. In addition, the removal of the soil and bedrock in the excavation will increase the vulnerability of the aquifer at that location. In order to assess the potential impact to groundwater due to cuttings, the length of cuttings >5m were compared across all of the corridor options. This was assessed also in relation to the groundwater vulnerability in that location.

Groundwater Dependent Terrestrial Ecosystems (GWDTEs)

Groundwater Dependent Terrestrial Ecosystems (GWDTE) are habitats/ species that rely upon groundwater to maintain their required environmental conditions. River Boyne and River Blackwater SAC has been listed as a Special Area of Conservation for protection for a number of qualifying interests, including two GWDTE qualifying interest. Killyconny Bog SAC is also listed as a Special Area of Conservation for protection for a number of qualifying interests, including two GWDTE qualifying interest. The distance of the nearest significant cutting of the route corridor to the SAC was assessed to identify impacts to GWDTE. The groundwater flow will reflect the topography and will generally be towards the rivers where it provides base flow.

Results

All corridor options and their associated impact scores are presented in Table 9-27, below. Based on this, an overall impact score has been determined for each corridor option and a preference has been assigned, where P = most preferred, I = intermediate, and LP = least preferred. It should be noted that a low impact score corresponds to a more negative impact, and therefore, a lower preference.

Table 9-27 Hydrogeology Impact Scores

Stage 2 Options	Aquifer classification	Groundwater vulnerability	GWDTE	Cuttings
Option A	3	1	4	4
Option B	2	1	2	2
Option C	3	1	3	3
Option Cv1	3	2	3	2
Option Cv2	3	1	3	3
Option D	3	2	3	1
Option Dv1	3	2	3	1
Option E	3	3	3	2
Option Ev1	3	3	3	2
Option Ev2	3	3	3	2

Corridor option A has been identified as most preferred.

Corridor options C, Cv1, Cv2, E, Ev1 and Ev2 have been identified as an intermediate preference.

Corridor option B, D and Dv1 has been identified as least preferred.

The designated ranking for all corridor options, where 1 is most preferred and 10 is least preferred, is shown in Table 9-28.

It should be noted that the risk of potential impacts from the proposed development on the hydrogeological regime of the study area may be reduced by the incorporation of particular measures in the road design.

Table 9-28 Stage 2 Hydrogeology Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	3	Minor or Slightly Negative	Most Preferred	1
Option B	2	Moderately Negative	Least Preferred	10
Option C	3	Minor or Slightly Negative	Intermediate	5
Option Cv1	3	Minor or Slightly Negative	Intermediate	5
Option Cv2	3	Minor or Slightly Negative	Intermediate	5
Option D	2	Moderately Negative	Least Preferred	8
Option Dv1	2	Moderately Negative	Least Preferred	8
Option E	3	Minor or Slightly Negative	Intermediate	2
Option Ev1	3	Minor or Slightly Negative	Intermediate	2
Option Ev2	3	Minor or Slightly Negative	Intermediate	2

9.4.10 Cultural Heritage

John Cronin and Associates were commissioned to conduct Cultural Heritage assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 10 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

A range of published desk-based data sources (online and paper) were consulted for purposes of identification of recorded Cultural Heritage sites within the Study Area. The desktop study also sought to identify any previously unrecorded features or areas of heritage significance. This research information has provided an insight into the historical development of the Study Area over time and has assisted in an evaluation of the potential presence of unrecorded Cultural Heritage sites.

The *Sites and Monuments Record* (SMR) and the *Record of Monuments and Places* (RMP) for County Cavan and County Meath, both published by the Archaeological Survey of Ireland, were the principal sources consulted for identifying known archaeological sites. The *Record of Protected Structures* (RPS) and the *National Inventory of Architectural Heritage* (NIAH) for Counties Cavan and Meath were also consulted to assess the designated architectural heritage resource.

The following presents an overview of the sources consulted as part of the desktop study:

- Cavan County Council Development Plan 2014-2020; Draft Cavan County Council Development Plan 2022-2028; Meath County Development Plan 2013-2019; and Draft Meath County Council Development Plan 2020-2026,
- Sites and Monuments Record (SMR)/Record of Monuments and Places (RMP),
- UNESCO designated World Heritage Sites and Tentative List,
- National Monuments in State Care List,
- Preservation Orders (2019),
- Register of Historic Monuments (RHM),
- National Inventory of Architectural Heritage (NIAH),
- Database of Irish Excavation Reports,
- National Museum of Ireland (NMI) Topographical Files,
- Historical Cartographic Sources,
- Aerial imagery, and
- Published reference material and cartographic/aerial sources.

Field survey was undertaken within the study area on 21 and 22 April 2021 and consisted of a windshield survey and site visits by a suitably qualified Cultural Heritage specialist. In addition, field survey facilitated cursory interpretation of landscape setting relevant to recorded sites and site groupings; a consideration of local topography, existing land-use and potential presence of unrecorded Cultural Heritage sites, as well as identification of areas of archaeological potential (AAP).

It is considered that any assessed feasible option design corridors may be subject to change and augmentation, in order to avoid any unacceptably high magnitude negative impacts on the known Cultural Heritage resource. The quality, significance, extent, duration and type of effect of all likely impacts on the Cultural Heritage resource are considered per current EPA draft EIAR Guidelines and Advice Notes (2015 and 2017). In order to prepare a quantitative and qualitative Cultural Heritage impact comparison of options, impact assessment tables have been provided for each 300m wide option assessment corridor, addressing each respective identified heritage receptor therein. The Cultural Heritage receptor data details the type of impact (direct, indirect or potential direct), the significance/value (rated Very High to Negligible) of the receptor and the level of predicted (negative) impact (rated Profound to Imperceptible).

In some instances, recorded extant receptors located outside the 300m assessment corridors have been considered in order to take cognisance of the landscape setting and visual amenity relevant to same.

Significance criteria can have due regard to an overall assessment of the legal designation, condition/preservation, documented/historical records, grouping value, rarity, visibility in the landscape, fragility/vulnerability and amenity value of the heritage receptor.[22] It is noted however that these criteria are not definitive but rather, are indicators which contribute to wider professional judgement, based on the individual circumstances of each receptor. It is noted that windshield field survey of the study area was undertaken in April 2021, with focus also on-site inspection of receptors and locations vulnerable to direct impact by the proposed route option corridors.

The level of impact on a given cultural heritage receptor is based on the significance (value) of that receptor and whether the type of (negative) impact is direct, potential direct or indirect. The level of impact assessment indicators tabulated below are to be utilised together with a consideration of the location, type, siting, design and layout of the proposed road options.

The Zone of Notification (ZoN) for a given SMR/RMP site can average between c. 20m - 60m or more in overall diameter, depending on the site type (e.g., a 'site of' a recorded burial ground could be much more extensive), and as such, due cognisance has been taken of the zone and the impact therein when considering the Level of Impact on the recorded archaeological site.

By assessing the type of impact together with a consideration of the value/significance of that asset, a determination can be made in ascertaining a predicted level of impact on the heritage asset.

It is important to note that the centreline is an arbitrary line for design purposes at option assessment stage, and may be subject to change and augmentation, in order to avoid unacceptably high-level negative magnitude impact(s) on the known Cultural Heritage resource. Furthermore, any impacts identified as 'direct' shall be classified as such by virtue of the site(s) being located within the 300m wide designed option *corridor.* These identified direct impacts may be avoided and/or reduced, as the design iteration process refines from option corridor analyses to designed preferred option alignment, for purposes of the overall project.

Option Appraisal is based on both a qualitative and quantitative assessment of the heritage receptors affected by each option. A comparison of the options is considered in terms of the level of impact(s) identified, and the archaeological potential of each corridor. However, it should be noted that the heritage Option Appraisal does have certain limitations in that it is difficult to ascertain the exact level of impact due to the potential to reveal, in the future, previously unknown and buried archaeological sites as part of an archaeological testing strategy. As such, the Option Appraisal and comparison is based on data available from statutory bodies at the time of writing.

In general terms, the comparative evaluation of each overall option corridor is assisted by scoring of impacts to the overall presence of sensitive heritage receptors using the Multi-Criteria Analysis (MCA) Impact Scoring Key per the *Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis* (TII, 2016). An impact assessment has been undertaken of each identified option corridor (300m), and each nodal pair therein, to facilitate both a quantitative and qualitative appraisal.

Each option (and respective sets of nodal pairs) shall be scored based on the referenced TII PAG – MCA Criteria seven-point scale and an integer assigned according to the overall impact level. The (negative) MCA

[22] See TII (2005) *Guidelines for the Assessment of Archaeological Impacts of National Road Schemes: Appendix 2.*

scores 1-4 are correlated to the impact assessment, although it is noted that this shall be an overall assigned score relative to the overall assessment of both the option corridor and each set of nodal pairs therein.

Finally, an overall preference categorisation from a Cultural Heritage perspective is assigned for each of the identified options. The MCA impact scoring of each nodal pair relative to each option in terms of the Environment sub-criterion Cultural Heritage has been assigned, and an overall option preference determined (preferred, intermediate, least preferred).

Assessment

The detailed assessment for each option corridor is presented in Section 10 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report and a summary of cultural heritage receptors is discussed in this section.

- There is a total of 36 No. recorded SMR/RMP sites located within the 300m design corridors that are applicable to the Feasible Route Options (FROs).
- A review of the topographical files at the National Museum of Ireland (NMI) revealed that a large quantity of recorded artefacts has been retrieved from the Study Area.
- The translations of the townland names within the Study Area were sourced from **www.logainm.ie** and mainly record topographical features and potential associations with past named ownerships. All of these placenames add to the overall evidence-base of continued human settlement of the Study Area from earliest times, and in particular during the early/late medieval period.
- There are 3 no. County Geological Sites (CGSs) located within the Study Area.
- There is 1 no. RPS structures located within the FRO 300m assessment corridors. There is a total of 7 no. built heritage structures as recorded in the NIAH survey, within the FRO 300m assessment corridors.
- There are 2 no. (non-designated) historic gardens and demesnes of note within the FRO 300m assessment corridors.
- A detailed review of the 1st, 2nd, and 3rd edition OS historic mapping relating to the FRO 300m corridors identified a total of 15 no. potential sites/features of interest.
- A large volume of water body crossings has been noted throughout the FRO 300m assessment corridors. These areas are considered to be of archaeological potential due to the availability of a fresh water source for past human habitation purposes as well as economic, social and transport corridors applicable to the larger river networks such as the Blackwater.
- In total 7 no. field-based Cultural Heritage features were noted within the 300m assessment corridors.

Results

Detailed below in Table 9-29 is a summary quantification breakdown of each Cultural Heritage receptors relative to the 300m option corridors. Furthermore, Table 9-30 details a summary of MCA scoring and preferences of the feasible route options based on Cultural Heritage findings.

Table 9-29 Summary Quantification Breakdown of Cultural Heritage Receptors within 300m Corridors

Option	Total CH Receptors	Total SMR/RMP	Total Excav	Total RPS/NIAH	Total HGS	Total AAPs	Total Field Survey	Total Historic OS
A	47	21	5	3	1	9	3	5
B	46	14	5	4	1	13	5	4
C	46	19	5	3	1	10	2	6
Cv1	32	16	5	2	0	5	1	3
Cv2	41	18	5	3	1	8	2	4

D	32	10	5	2	0	10	1	4
Dv1	32	10	5	2	1	10	1	3
E	40	15	5	3	1	10	2	4
Ev1	39	14	5	3	0	10	2	5
Ev2	37	13	5	2	1	11	1	4

Table 9-30 Stage 2 Cultural Heritage Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Key Impacts	Option Ranking
Option A	1	Major or Highly Negative	Least Preferred	Profound impact on a ringfort CV044-011--- located along existing N3 road; significant impact on a well-defined ringfort CV039-013--- that is likely to be partially impacted by alignment footprint	9
Option B	2	Moderately Negative	Least Preferred	Closest option in proximity to Loughcrew (slight indirect impact); 9 no. moderate impacts (incl NIAH structures, railway line and infrastructure, Eighter historic demesne)	5
Option C	1	Major or Highly Negative	Least Preferred	Significant impacts on 2 no. well-defined ringforts CV039-013--- and CV039-025--- likely to be impacted in part by alignment footprint	10
Option Cv1	2	Moderately Negative	Intermediate	3 moderate impacts on a castle site (S tie in area); a mound CV044-012--- (possible grouping with a ringfort CV044-011--- noted) and a partially extant ringfort CV039-059---	4
Option Cv2	2	Moderately Negative	Least Preferred	Significant impact on a well-defined ringfort, alignment footprint likely to impact in part CV039-013---	8
Option D	3	Minor or Slightly Negative	Most Preferred	1 moderate impact on castle site ME010-021--- at S tie in area (common to all options)	1
Option Dv1	3	Minor or Slightly Negative	Most Preferred	1 moderate impact on castle site ME010-021--- at S tie in area (common to all options)	2
Option E	2	Moderately Negative	Least Preferred	1 Profound impact on farmstead at Lisnabantry (undesignated), 2 Significant impacts on ringfort and souterrain site at Lisnabantry CV039-061001-	7
Option Ev1	2	Moderately Negative	Least Preferred	1 Profound impact on farmstead at Lisnabantry (undesignated), 2 Significant impacts on RF and souterrain site at Lisnabantry CV039-061001-	6
Option Ev2	**3**	Minor or Slightly Negative	Most Preferred	1 moderate impact on a castle site ME010-021--- (S tie in- common to all options)	3

9.4.11 Material Assets – Non-Agricultural

Barry Transportation conducted the Non-Agricultural Material Assets assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 11 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

A desktop study was performed for this section of the option selection. The information gathered from this was used to assess the potential impacts that each of the options would have on Non-Agricultural Material Assets.

Material sources used for this assessment include, but are not limited to, the following:

- OSi 1:50,000 mapping;
- Aerial photography (Google Maps and Street View); and
- Utilities datasets (ESB, Gas, Water).

The impacts on each asset will be described and summarised in the report. Each impact was scored based on TII's seven-point scale (PE-PAG-02031).

The TII Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (2016) specifically define Non-Agricultural Properties as "*All affected properties and types of land classed as commercial, recreational, open space, minerals and public facilities (hospitals, schools, and religious institutions) which are not of an agricultural nature*". This definition is similar to the definition of Community Assets DMRB Sustainability and Environmental Appraisal guidelines for Population and Human Health which includes "village halls, healthcare facilities, education facilities, religious facilities, village greens, open green space, allotments, sports pitches etc". Therefore, in the absence of specific TII guidance for the assessment of Non-Agricultural Properties or Material assets, these DMRB guidelines will help inform the assessment of the following assets:

- Development Lands – Lands or Sites zoned within the County Development Plan;
- Residential, Commercial and Industrial Properties; and
- Public facilities, including Schools, Parks, Sports Complexes and Healthcare Facilities.

The TII Guidelines note that the impact assessment criteria adopted in the MCA are adapted from the EPA 'Guidelines on Information to be contained within Environmental Impact Statements' (March 2002). These 2002 EPA Guidelines were revised with 'Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)' published in 2017. These draft guidelines were published to account for updated EIA Directive. In line with the more recent EPA Guidelines, material assets include:

- Built Services; and
- Roads and Traffic;

In the absence of specific TII guidance for the assessment of material assets, this assessment will be conducted in line with the EPA 'Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)'

A full list of the Non-Agricultural Material Assets assessed in this chapter is outlined below:

- Built services;
- Development Lands – Lands or Sites zoned within the County Development Plan;
- Transport & Infrastructure (Roads and Traffic);

- Forestry;
- Residential, Commercial and Industrial Properties; and
- Public facilities, including Schools, Parks, Sports Complexes and Healthcare Facilities.

Assessment

A summary of Non-Agricultural Material Assets assessed is provided in this section and the detailed assessment for each option is presented in Section 11 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Built services

The potential built services conflicts were assessed over the length of end-to-end option corridors. Each option was comparatively assessed and assigned an impact score separately on diversions and protection/clearance confirmation. The scores were then averaged to give an overall utility rating. Note that diversions to the transmission gas network were given an increased rating due to their increased cost and complexity.

This conflict summary did not assess the following:

- Clearance levels to all overhead lines;
- Cover levels to all underground services;
- Existing watermain infrastructure less than 100mm diameter;
- Existing LV electricity network; and
- Existing Eir Network (information was not readily available due to ongoing technical difficulties on the website).

Development Lands – Lands or Sites zoned within the County Development Plan

Planning and development policy in the Study Area is principally set out in three documents. The Cavan County Development Plan 2014 – 2020 (CCDP) identifies zoned lands in Virginia Town. The corridors for Options A, C and Cv2 encroach on lands currently zoned in the CCDP 2014 – 2020. It is likely that a direct impact can be avoided on these zoned lands. The draft Cavan County Development Plan 2022 – 2028 was placed on public display on May 28th 2021, with submissions on the draft plan invited until August 6th 2021. The Cavan County Development Plan 2022 - 2028 will come into effect on 11th July 2022. At the time of the assessment, most of the options were outside the zoning area of Virginia's Land Use Zoning Map within the draft plan. The corridors associated with Options A, C and Cv2 will encroach on lands zoned in the draft plan. Link roads associated with these options, along with Option Cv1, will also impact on lands proposed to be zoned in the draft plan.

The Meath County Development Plan 2021 - 2027 came into effect the end of 2021. Within County Meath, there are no zoned lands that are affected by the N3 Virginia Bypass scheme.

Transport & Infrastructure (Roads and Traffic)

Each option was comparatively assessed and assigned an impact score separately on its impacts to the existing road network and railway network. The scores were then averaged to give an overall Transport and Infrastructure rating.

Where existing local roads intersect an option, they may be bridged, realigned or an alternative service road may be provided. Therefore, the N3 Virginia Bypass should not have a quantifiable impact on these local roads. At this stage of the project, an assumption has been made that where an option crosses a regional road, a junction will be provided. Due consideration was given to options where provision of a junction is unlikely due to design constraints. The road scheme will also result in additional junctions on the national

roads which will have a negative impact for through traffic. The options were comparatively assessed based on the number of additional junctions proposed on the N3, R178, R194 and R195.

There is no existing live railway network in County Cavan. There are no current plans to bring abandoned rail lines back into use, nor to develop new rail infrastructure. Therefore, all options are deemed to have a neutral impact.

Forestry

There are forestry areas affected by all of the options. The most significant forestry areas that would be impacted are located on the eastern side of Lough Ramor.

Residential, Commercial and Industrial Properties

This part of the assessment considers residential, commercial and industrial properties fully and partially impacted by the scheme. The potential impact of options on residential and commercial properties was determined by utilising the Geodirectory dataset and aerial mapping on properties within the Study Area. The number of properties and gardens impacted were tabulated and assigned an impact score accordingly. Where residential properties associated with farm enterprises are impacted by the options, they are considered in the Agriculture section.

No industrial properties are impacted directly by the scheme.

Public facilities, including Schools, Parks, Sports Complexes and Healthcare Facilities

The impacts on following public facilities and amenities were assessed in this section.

- Virginia Primary Care Centre: located on the southeast approach to the town and accessed from the N3;
- Schools: two schools presently located within Virginia Town;
- Virginia Football Club: located at Kings Park, adjacent to the Carnaross Sand and Gravel facility in Pottlereagh;
- Ramor Utd GAA Sports Complex: located on the southeast approach to the town and accessed from the N3; and
- Virginia Rugby Football Club: located within the town of Virginia and accessed from the R194 Ballyjamesduff Road.

Results

As previously described, most of the option corridors have a similar impact on non-agricultural material assets. On average, all options have a slightly negative rating, with their order of preference being determined by considering the overall average to 1 decimal place. Options E and Ev2 were most preferred. Option A is the least preferred option.

Table 9-31 Stage 2 Material Assets – Non-Agricultural Assessment Summary

Stage 2 Options	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	3	Minor or Slightly Negative	Least Preferred	10
Option B	3	Minor or Slightly Negative	Intermediate	5
Option C	3	Minor or Slightly Negative	Intermediate	7
Option Cv1	3	Minor or Slightly Negative	Intermediate	7
Option Cv2	3	Minor or Slightly Negative	Intermediate	7

Option D	3	Minor or Slightly Negative	Intermediate	5
Option Dv1	3	Minor or Slightly Negative	Intermediate	3
Option E	4	Not Significant or Neutral	Most Preferred	1
Option Ev1	3	Minor or Slightly Negative	Intermediate	3
Option Ev2	4	Not Significant or Neutral	Most Preferred	1

9.4.12 Agriculture

John Bligh and Associates were commissioned to conduct Agriculture assessment for N3 Virginia Bypass Scheme. A summary of the assessment is included in this section while the detailed assessment is presented in Section 12 of Volume 5 (Stage 2 Environmental Appraisal Report) of the Option Selection Report.

Methodology

The methodology for this assessment is based on a desktop review of the study area using available scheme information including information gathered during the constraints study and a roadside survey.

In line with best practice, the assessment and appraisal of the impact on agriculture was prepared with regards to the following guidance documents:

- Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
- Directive 2014/52/EU amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment.
- Project Appraisal Guidelines for National Roads Unit 7.0 – Multi Criteria Analysis (2016)

Under the TII guidance, it is necessary to establish a scoring procedure to show how each option performs for the assessment of the impact on agriculture. This is to include a quantitative and a qualitative assessment of the impact of options on agricultural property. The qualitative assessment for agriculture will consider landcover type and, specifically, improved grassland as an indicator of productive agricultural land. Agricultural constraints and those indicative of agricultural lands of high quality and intensive agricultural production will also be considered. The quantitative assessment will include the number of farmhouses, farmyards and key agricultural constraints together with a weighted property impact score and the level of significant impacts on key agricultural constraints.

The desktop review involved a survey of available mapping for the study area and online aerial photography. Data sources used during the desktop review are outlined in Table 9-32.

Table 9-32 Information Sources

Information	Source
Digital mapping – Discovery, Ordinance Survey and Satellite imagery	Cavan County Council via Barry Transportation
Agricultural constraints	N3 Constraints Report
Landownership	Property Registration Authority of Ireland (PRAI)

Information from local consultation with representatives of the agricultural sector and roadside surveys that took place during the preparation of the constraints report were relied upon for the Stage 2 options assessment.

The methodology for the options assessment comprises of a qualitative and quantitative appraisal of a 300m option corridor and the direct impact of the option alignment on agricultural property. The approach to the appraisal for MCA purposes has been to evaluate options separately under value-based criteria and impact-based criteria. The impact category for route options is determined from the value rating combined with the impact rating. There are three categories relevant to the assessment of the impact on agriculture that comprise of 'Minor or slightly negative', 'Moderately negative' and 'Major or highly negative'. These categories are taken from the seven-point scale in TII guidance (TII PAG, 2016)[23].

The agricultural option assessment considers qualitative and quantitative criteria for a 300m option corridor and along a potential alignment. The qualitative assessment considers landcover type along the corridor and, specifically, the level of improved grassland as an indicator of productive agricultural land relative to other categories of forestry / woodland and rough grassland / scrub / peat. The presence of agricultural constraints along an option corridor, as identified during the constraints study, can be an indicator of higher-quality agricultural lands, higher intensity production and / or the sensitivity of agricultural activities to road development depending on the type of constraint. Dairy constraints typically involve intensive agricultural production on high quality lands and are sensitive to landtake and land severance impacts associated with road development. Equine constraints typically involve moderate to intensive interaction with horses and can be considered sensitive to noise and visual impacts associated with road development. Pig and poultry constraints typically involve intensively operated indoor housing units in a compact farmyard setting and are considered sensitive to landtake impacts. Tillage constraints typically indicate high quality lands while agribusinesses are typically locations of local employment within the sector and can be considered sensitive to the impact of road development.

The quantitative assessment considers criteria parameters that will enable the performance of options to be evaluated. The value-based criteria will include the number of agricultural receptors such as farmhouses, farmyards and agricultural constraints along the option corridor. The impact-based criteria will include an impact assessment of the option alignment on individual agricultural properties. This property-based assessment will include an impact assessment of agricultural properties comprised of an individual property folio or several property folios that are deemed to be farmed as a single farm holding. On each option, a weighted score is applied to direct impacts on farm holdings, farmhouses and farmyards. The cumulative farm impact score for each option will inform the option impact rating.

Assessment

The following impacts on agricultural lands were encountered. Each of the following were assessed for corridor options and an impact score was assigned as described above in Methodology section.

Landtake

The impact of landtake on agricultural lands will result in a reduction in the available agricultural lands on affected farm holdings.

[23] Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis, TII Publications (Technical) PE-PAG-02031 (Oct 2016)

Land Severance

The impact of land severance may result in the loss of access to lands or the division of lands into two or more separate portions of lands. This will negatively impact on the management of impacted lands and the operation of the existing farm enterprises.

The agricultural impacts of landtake and severance are greatest under landcover of improved grassland on which all moderate to intensive agricultural activity is conducted.

Impact on Farmhouses

A direct impact on a farmhouse is a significant negative impact on an agricultural property.

Impact on Farmyards

A direct impact on a farmyard or part of a farmyard can be a significant negative impact on the operation of the farming enterprise.

Impact on Sensitive Agricultural Enterprises

Farm enterprises such as those identified in the agricultural constraints report are considered more sensitive to road development. There is a greater agricultural impact on these farms primarily due to the impacts of landtake and severance.

Mitigation of Access

The options assessment of the impact on agriculture has assumed that access will be restored to lands where it is removed or restricted. Access will be provided to lands via access accommodation structures, accommodation access tracks or the provision of field access gates. The mitigation of severance on dairy farms may include the provision of private access accommodation structures.

Results

Option preferences were determined based on a comparative assessment of the option requiring the identification of high, intermediate, and low preferences. There is a high preference for Option Dv1 with a minor or slightly negative impact on agriculture. There is an intermediate preference for Option Ev1, Option E, Option Ev2, Option D and Option A with a moderately negative impact on agriculture. There is a low preference for Option C, Option Cv1, Option Cv2 and Option B with a major or highly negative impact on agriculture.

Table 9-33 Stage 2 Agricultural Assessment Summary

Stage 2 Options	Value Rating	Impact Rating	Impact Score	Impact Category	Option Preference	Option Ranking
Option A	Medium	Medium	2	Moderately Negative	Intermediate	6
Option B	High	High	1	Major or Highly Negative	Least Preferred	10
Option C	High	High	1	Major or Highly Negative	Least Preferred	7
Option Cv1	High	High	1	Major or Highly Negative	Least Preferred	8
Option Cv2	High	High	1	Major or Highly Negative	Least Preferred	9
Option D	Medium	Medium	2	Moderately Negative	Intermediate	5
Option Dv1	Medium	Low	3	Minor or Slightly Negative	Most Preferred	1

Option E	High	Low	2	Moderately Negative	Intermediate	3
Option Ev1	High	Low	2	Moderately Negative	Intermediate	2
Option Ev2	High	Low	2	Moderately Negative	Intermediate	4

9.4.13 Environment Appraisal Summary

Upon the determination of a single overall performance score for each of the eleven sub-criteria, each of these scores was added together to provide an overall Environment Appraisal performance score for each of the Option Corridors.The results of the Environment Appraisal are shown in Table 9-34 below.

Table 9-34 Environment Appraisal – Impact Scores Summary Table

Sub-Criteria	Option A	Option B	Option C	Option Cv1	Option Cv2	Option D	Option Dv1	Option E	Option Ev1	Option Ev2
Air Quality and Climate	5	5	5	5	5	5	5	5	5	5
Noise	1	1	1	1	1	2	2	2	2	2
Landscape & Visual (including light)	1	1	1	1	1	2	2	2	1	1
Biodiversity - Flora and Fauna	3	1	1	2	2	2	2	1	1	2
Waste	3	3	2	2	3	2	2	2	2	2
Soils & Geology	3	3	3	2	3	2	2	2	2	3
Hydrology	2	2	3	4	3	4	4	3	3	4
Hydrogeology	3	2	3	3	3	2	2	3	3	3
Cultural Heritage	1	2	1	2	2	3	3	2	2	3
Non-agricultural Material Assets	3	3	3	3	3	3	3	4	3	4
Agriculture	2	1	1	1	1	2	3	2	2	2
Overall Environment Appraisal Impact Score	27	24	24	26	27	29	30	28	26	31

9.5 Accessibility and Social Inclusion Appraisal

9.5.1 Introduction

The Accessibility and Social Inclusion Appraisal has been undertaken in accordance with the Multi-Criteria Analysis approach, as defined in TII's PAG Unit 7.0. The Government objectives for reducing social exclusion is set out in the Roadmap for Social Inclusion 2020 – 2025: Summary of Ambition, Goals and Commitments (January 2020) and other national policy documentation. Recognising the broad nature and aspects of Accessibility and Social Inclusion, TII's PAG Unit 7.0 limits the Accessibility and Social Inclusion Appraisal for transport projects to the following two Sub-Criteria:

- Deprived Geographical Areas
- Vulnerable Groups

In the case of the Accessibility and Social Inclusion Appraisal, due to the nature of the subject matter, it was not reasonably practicable to quantitively assess the impacts. Therefore, the impact level and Performance Score for each Option Corridor was qualitatively assessed against each of the two Sub-Criteria.

9.5.2 Deprived Geographical Areas

Pobal HP Deprivation Index

The 2016 Pobal HP Deprivation Index shows the level of overall affluence and deprivation across the country using identical measurements and scales using data from the 2016 Census of Population. Figure 9-4 below shows that the index varies in the study area from 'Marginally Above Average' to 'Disadvantaged'. Option B passes through areas that are predominately within the 'Marginally Below Average' sub-category, with part of the option within the 'Disadvantaged' sub-category. Potential junction locations of the bypass option on the R194 Ballyjamesduff Road and the R195 Oldcastle Road may provide better access to these disadvantages areas. The eastern options are broadly similar and predominately sit within the 'Marginally Above Average' category. It is noted that part of Option E (and some variants) pass through an area identified as 'Marginally Below Average'. Option B has been given a score of 5 'Slightly Positive' while all other options have been given an equal neutral score of 4 for Deprived Geographical Areas.

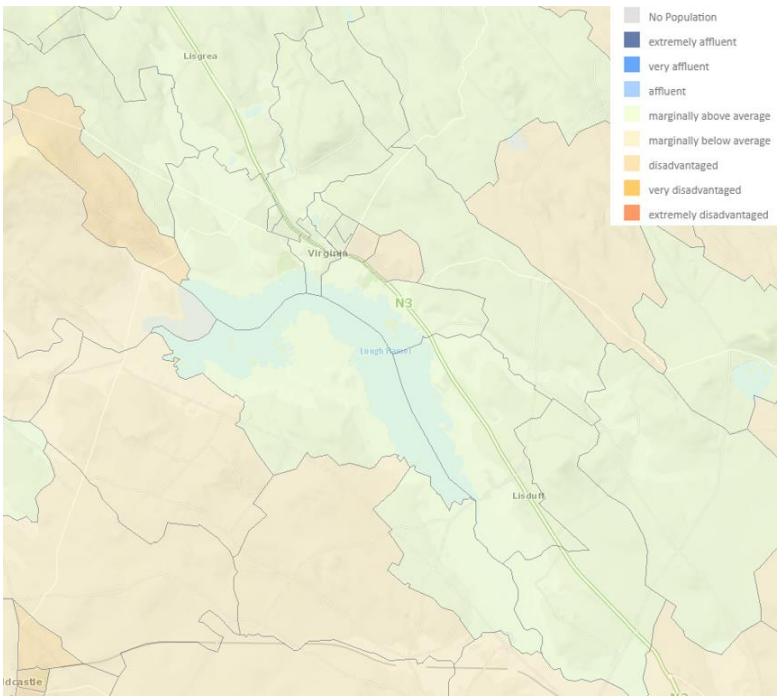


Figure 9-4 2016 Pobal HP Deprivation Index Categories ('By Small Area') within the Study Area

CLÁR programme

The CLÁR programme (Ceantair Laga Árd-Riachtanais) has identified rural areas that have suffered significant levels of population decline in order to provide funding for small scale infrastructural projects. Most of the study area, with the exception of Loughan and Oldcastle EDs, is covered by the CLÁR programme. The potential junction locations of the bypass option with the regional road network may provide better access to these CLÁR areas. Therefore, all options are broadly similar in ranking and will provide an equal 'Slightly Positive' score of 5 for CLÁR Areas.

Figure 9-5 Extract from CLÁR Map (County Cavan)

Table 9-35: Impact Score of Options in terms of Deprived Geographical Areas

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Pobal HP Deprivation Index	4	5	4	4	4	4	4	4	4	4
CLÁR Areas	5	5	5	5	5	5	5	5	5	5
Overall Impact Score (rounded average)	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**

9.5.3 Vulnerable Groups

In accordance with TII's PAG Unit 7.0, impacts to identified Vulnerable Groups are to be considered and assessed. TII's PAG Unit 7.0 notes that 'the term Vulnerable Groups can include; vulnerable women, children, young people, older people, people with disabilities, ethnic minorities, and lower income socio-economic groups'.

It is recognised that transport investment can play an important role in improving access for Vulnerable Groups to employment, education, essential services and amenities.

There are a range of national strategies and programmes in place to advance the implementation of the Convention's provisions, including the empowerment of persons with disabilities to live self-directed lives of their own choosing. Basic civil and political rights for all are guaranteed under the Constitution. Ireland's extensive suite of equality legislation outlaws discrimination, and successive iterations of the National Disability Strategy have set out an approach of progressive realisation of the aims of the Convention, working to resolve many social and economic issues. Other national policies and strategies include the Comprehensive Employment Strategy, the Transforming Lives Programme, and the National Housing Strategy for Persons with Disabilities.

The policy document Realising our Rural Potential: The Action Plan for Rural Development, this Action plan also aims to combat rural isolation by improving connectivity and enhancing supports for older people, including significant investment in the Senior Alert scheme. The objective of the Senior Alert Scheme is to encourage community support for vulnerable older people in our communities through the provision of personal monitored alarms to enable older persons, of limited means, to continue to live securely in their homes with confidence, independence and peace of mind.

Other initiatives such as the Local Link manages the 'Rural Transport Programme' within the Study Area. The programme delivers services in rural areas, providing transport services in areas where public transport is not readily available.

Pillar 5 (Improving Rural Infrastructure and Connectivity) of the Action Plan for Rural Development recognises the importance of improved road infrastructure to support social and economic potential and reduce social inclusion for rural communities, which also includes Vulnerable Groups.

It is considered that the proposed scheme, and all of the Option Corridors, which align with key accessibility and social inclusion national policies (Project Ireland 2040, Roadmap for Social Inclusion 2020 – 2025, Realising our Rural Potential: The Action Plan for Rural Development), will have a positive impact on Vulnerable Groups. The scheme and all associated options seek to provide improved strategic road infrastructure, which aims to reduce social exclusion by providing safer and enhanced accessibility to the road network, and consequently to services from designated rural zones within the Study Area, along with supporting road based public transport by improving journey times and journey time reliability. This has the potential to allow for more efficient and safer accessibility for Vulnerable Groups to Virginia within the Study Area or other urban centres outside the Study Area, where higher concentrations of employment opportunities, and essential services (medical, education, commercial, etc.) can be accessed.

In terms of differentiation between the options, at this stage, it is considered that the level of positive impact is broadly similar across all options. In conclusion, in relation to the Sub-Criterion of Vulnerable Groups, it is deemed that all options will have a 'Minor or Slightly Positive' Impact, and are allocated a Performance Score of 5.

9.5.4 Accessibility and Social Inclusion Appraisal Summary

Upon the determination of a single overall performance score for each of the sub-criteria, each of these scores was added together to provide an overall Accessibility and Social Inclusion Appraisal performance score for each of the Option Corridors. The results of the Accessibility and Social Inclusion Appraisal are shown in Table 9-36 below.

Table 9-36: Accessibility & Social Inclusion Appraisal – Impact Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Deprived Geographical Areas	5	5	5	5	5	5	5	5	5	5
Vulnerable Groups	5	5	5	5	5	5	5	5	5	5
Overall Impact Score	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**

9.6 Integration Appraisal

The Integration appraisal has been conducted in accordance with the TII Project Appraisal Guidelines Unit 7.0: Multi-Criteria Analysis. The basis of the appraisal covers the following key areas:

- Transport Integration
- Land use Integration
- Geographical Integration
- Other Government Policy Integration: Regional Balance

9.6.1 Transport Integration

This section of the appraisal aims to address the promotion of the integration of transport infrastructure and services by focusing on gaps in the existing network and improving opportunities for interchange between modes of transport. The performance of each option with respect to four sub-criteria is considered for this section.

Connectivity of the strategic road network

With regard this sub criterion, TII's PAG Unit 7.0 states that *'It is important that proposed investment on the National Road network is strategic in the sense that it creates a strong link to the existing network and adds value to it. In this regard, schemes which improve connectivity of the National Road network or satisfy an identified gap in the network should be ranked positively. Similarly, those projects which little or no connectivity to the existing network should be negatively ranked.'*

It is considered that the N3 Virginia Bypass scheme and its Scheme Objectives align with current national, regional and local policies in terms of improving accessibility between the North-West and the Greater Dublin Area, whilst also in terms of increasing connectivity between the main urban and economic centres along the N3 / A509 route.

Under Project Ireland 2040, the National Development Plan (NDP), which supports the National Planning Framework (NPF) 2040, states *'Investment in these projects'*, which included the N3 Virginia Bypass, *'contribute to the National Strategic Objectives of Enhanced Regional Accessibility and Compact Growth, connecting communities and encouraging economic activity'*.

Access to the new route will be possible only at the scheme tie in points, at most Regional Road crossing and at 2 proposed link road junctions, providing an opportunity for strategic traffic to access the route, without introducing a significant number of conflict/access points.

In terms of the specific assessment of the Option Corridors, it is considered that all options will equally improve connectivity of the National Road Network, and that all options will equally improve accessibility to the north-west identified by Project Ireland 2040 for improvement of the existing N3 National Primary Route.

In conclusion, it is deemed that all options have a 'Major or Highly Positive' impact' in terms of the Sub-Criterion Element of 'Connectivity of the Strategic Network', and are allocated a Performance Score of 7.

Connectivity between transport modes

This Sub-Criterion Element is centred on the integration of the road scheme and its options with the public transport network (rail and bus network). TII's PAG Unit 7.0 states 'Improving integration between transport modes and the delivery of more seamless transport connectivity is an important Government objective. TII projects support this objective by improving integration between the road network and other modes. Through the appraisal process, Projects (Options) which present new opportunities for public transport nodes or corridors should be positively ranked. Similarly, projects which could result in isolation of public transport services or infrastructure should be negatively ranked.'

Rail Infrastructure and Services

In relation to rail infrastructure and services, as outlined in Section 5.4.1 (Public Transport Alternative), it is identified that there are no existing operating rail services within the Study Area. The nearest operating train stations to the Study Area are Drogheda and Dundalk on the Dublin to Belfast line, which are approximately 59km and 61km (from Virginia Town), respectively and Edgeworthstown and Mullingar on the Dublin to Sligo line, which are approximately 46km and 47.5km, see Figure 9-6 below.

Figure 9-6 - Irish Rail Intercity Network

In terms of future development plans of rail infrastructure and services, the Government and Irish Rail have not outlined any specific objectives for the provision of new rail infrastructure within the Study Area. The 2030 Rail Network Strategy Review (2011), which outlines Irish Rail's future development requirements, makes no reference to any new rail routes within or within close proximity to the Study Area.

Therefore, regarding rail infrastructure and services, as there are no existing or proposed plans for a rail network in the Study Area, it is concluded that the proposed N3 Virginia Bypass scheme does not have a positive or negative impact on modal change from road to rail. Hence, connectivity to rail were not used to form assessment for integration.

Bus Infrastructure and Services

In relation to bus infrastructure and services, as outlined in Section 5.4.1 (Public Transport Alternative), it has been identified that there are existing national bus services along the N3 within the Study Area. They support both strategic bus links between Dublin and Cavan and onward to the North-West.

In terms of future services, the NPF 2040, NDP 2021 - 2030 and RSES recognise public transport (including Bus Services) will need to be further prioritised into the future with increased investment, which will lead to potentially greater coverage, accessibility, and frequency of bus services and stops. Notwithstanding this, and as identified the Assessment of Alternatives Report (Volume 6 Part A) and in the RSESs, the region within the Study Area 'has a particularly dispersed settlement pattern and lacks critical mass as evident in other parts of the island'. In order to meet this challenge, and as per the RSES for the North-West Region, it is considered that investment is required in both roads and bus transportation. It is considered that bus transportation cannot solely meet the challenge of the dispersed settlement pattern in the Study Area and the expected increased transport demands into the future. Furthermore, it is noted that bus transportation cannot reasonably serve the transportation needs of the strategic transfer of freight and large goods.

Regarding the N3 Virginia Bypass scheme, all Option Corridors are deemed to have a positive impact to the existing strategic bus routes operating on the N3 by improving journey times, journey time reliability and providing safer connectivity along the N3 Corridor.

The key transport hub within the Study Area is Virginia Town with Cavan and Kells the key transport hubs to the north and south of the study area. As all options bypass Virginia, there is no differentiation between the options in this regard. Bus travel into Virginia will be more reliable when through traffic is transferred to the bypass, and lower numbers of local traffic remaining on the existing road network. Hence for this qualitative assessment, whilst accounting for the fact that all options will have a positive impact to the existing bus network, the options that contribute to a significant reduction in traffic flow through Virginia Town centre and the options with the Ballyjamesduff link road and the Burrencarragh link road will remove significant traffic and would enable a HGV / axle ban from the town centre thus contributing to reducing traffic congestion through the existing junctions along the N3. The options that reduce traffic by 70% to 80% and would enable a HGV / axle ban from the town centre are scored Moderately Positive. Options that reduce traffic by 40% to 60% but do not enable a HGV / axle ban from the town centre are scored Slight Positive.

Support for sustainable transport modes

With regard this sub criterion, TII's PAG Unit 7.0 states that *'Planning for road network infrastructure needs to incorporate the needs of non-mechanised modes such as walking and cycling. Projects which improve the connectivity of existing sustainable transport networks should be highly ranked while the possibility of a scheme hindering the development of pedestrian and cycling networks should also be taken into account.*'

With reference to Section 1.5 (Scheme Objectives), it is highlighted that a key objective of the N3 Virginia Bypass scheme is to support the integration of walking and cycling with the proposed road scheme.

The importance of prioritising walking and cycling accessibility to both existing and proposed developments, including roads, is identified in the NPF 2040 under National Policy Objective 27 within the People, Homes and Communities Section:

'Ensure the integration of safe and convenient alternatives to Car into the design of our communities, by prioritising walking and cycling accessibility to both existing and proposed developments...'

As part of NPF's National Strategic Outcome 4 (Sustainable Mobility), under the heading of Public Transport, it outlines the objective to:

'Expand attractive public transport alternatives to car transport to reduce congestion and emissions and enable the transport sector to cater for the demands associated with longer term population and employment growth in a sustainable manner through the following measures:', where it lists the following measure in terms of cycling:

- *'Develop a comprehensive network of safe cycling routes in metropolitan areas to address travel needs and to provide similar facilities in towns and villages where appropriate.'*

In addition, the improvement of accessibility to sustainable transport modes in terms of walking and cycling is identified in a number of national, regional and local policy documents.

In terms of the existing pedestrian and cycle facilities on the existing N3 within the study area, it is noted that there are no formalised dedicated pedestrian and cycle facilities along the existing section of the N3 outside the built environment of Virginia Town, and Maghera, where existing footways are present.

The cross-section currently proposed for all options is a Type 2 dual carriageway. The cross section will be confirmed during Phase 3. The proposed cross-section will include a cycle track / pedestrian facility within the corridor which is separated from the paved road surface. Adding the Active Travel facility along the full length of the scheme and fully segregated from traffic will provide a safer and enhanced environment for pedestrians and cyclists. Where feasible, the active travel corridor along the bypass options will be linked into the existing regional and local road network the bypass crosses.

In conclusion, it is assessed that all options will improve the existing pedestrian and cycle facilities within the Study Area. In terms of the specific PAG Unit 7.0 criterion, it is considered that all options will not sever or isolate the existing walking/cycling routes within the Study Area. In terms of specific connectivity improvement to existing facilities, as stated above, it is assessed that all options will present opportunities, though it is considered that the options that contribute to a significant reduction in traffic flow through Virginia Town centre and the options with the Ballyjamesduff link road and the Burrencarragh link road will remove significant traffic and would enable a HGV / axle ban from the town centre thus contributing to reducing traffic congestion through Virginia thus enabling safer zones for pedestrians and cyclists.

The options that reduce traffic by 70% to 80% and would enable a HGV / axle ban from the town centre and thereby facilitate safer active travel as well as better connectivity to localised walking routes are scored Highly Positive. Options that reduce traffic by 40% to 60% but do not enable a HGV / axle ban from the town centre or do not provide good linkage to localised walking routes are scored Slight Positive.

Access to other transport infrastructure

With regard this sub criterion, TII's PAG Unit 7.0 states that *'Access to international ports and airports is of national economic importance and should be reflected in the appraisal of major road schemes. Although many schemes will rank as neutral in this regard, the potential of projects to impact on the capacity of routes serving these nodes should be accounted for in the MCA.'*

The enhancement of connectivity to maritime ports and airports is of key importance to Ireland in terms of the Island's economy. At a national policy level, this aspect is covered under the National Planning Framework (NPF) 2040 National Strategic Outcome 6 (High-Quality International Connectivity) where it states below, with specific relevance to the proposed Scheme in terms of improved connectivity to the North-West and the central border areas, which this proposed scheme will facilitate:

'As an island, the effectiveness of our airport and port connections to our nearest neighbours in the UK, the EU and the wider global context is vital to our survival, our competitiveness and our future prospects. Co-operation and joint development of cross-border areas such as the Dublin-Belfast corridor, North West, and central border areas are key to open up the potential of the island economy, post Brexit.'

The N3 Virginia Bypass options offer improvements to the road networks which will significantly reduce congestion along the N3 through Virginia and improve journey time reliability, therefore providing improved access to Dublin Port and Dublin Airport. Therefore, all options are deemed to be scored moderately positive and allocated a Performance Score of 6.

Transport integration summary

The table below summarises the scoring for each component of the Transport Integration sub-criterion. The average of all the components gives the overall impact score for Transport Integration.

Table 9-37 Transport Integration - Performance Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Connectivity of the Strategic Network	7	7	7	7	7	7	7	7	7	7
Connectivity between Transport Modes (bus)	6	5	6	5	6	5	5	5	5	5
Support for Sustainable Transport Modes	7	5	7	5	7	5	5	5	5	5
Access to Other Infrastructure	6	6	6	6	6	6	6	6	6	6
Sum of Individual Performance Scores (Out of 28)	26	23	26	23	26	23	23	23	23	23
Average Score	6.5	5.75	6.5	5.75	6.5	5.75	5.75	5.75	5.75	5.75
Overall Transportation Integration Performance Score	7	6	7	6	7	6	6	6	6	6

9.6.2 Land Use Integration

This criterion compares the performance of each option with respect to compatibility with adopted land use objectives and are appraised across three sub-criteria.

Support for local development plan

With regard this sub criterion, TII's PAG Unit 7.0 states that *'The project should be compatible with the aims and objectives of local development planning frameworks. Schemes ranking positively in this regard should form part of the development aspiration for the local area and have already been integrated into a sustainable framework for future development'*.

The county development plans relevant in the case of the N3 Virginia Bypass scheme span across two counties and are:

- Cavan County Development Plan 2014-2020;
- Draft Cavan County Development Plan 2022-2028;
- Meath County Development Plan 2021-2027.

The current Cavan County Development Plan 2014-2020 includes Road Infrastructure Objective PIO16 'To progress and develop the N3 National Primary Route, Edenburt to Cavan Bypass Scheme'. The bypass of Virginia falls within this geographical extent of objective PIO16.

The Virginia zoning map associated with the Cavan County Development Plan 2014-2020 includes a route for the Proposed Virginia Bypass.

At the time of writing this report the draft Cavan County Development Plan 2022-2028 had been adopted by the elected members of Cavan County Council but had not yet come into effect. The draft Cavan County Development Plan 2022-2028 includes specific objectives relating to the N3 Virginia Bypass:

It is a development objective of Cavan County Council to:

- VB 01 Work in conjunction with Transport Infrastructure Ireland, Department of Transport and Meath County Council in the planning and construction of the N3 Virginia Bypass Scheme.
- VB 02 Reserve and protect option corridors from development which would interfere with the delivery of the Virginia By-Pass.

The Meath County Development Plan 2021-2027 includes the following specific objectives relating to the N3 Virginia Bypass:

- Section 5.3 'Policy Context' – *A number of sections of the national road network will be progressed through pre-appraisal and early planning to prioritise projects which are proceeding to construction in the National Development Plan. These projects include: … N3 Virginia Bypass, …*
- Section 5.8 'Developments of National and Regional Strategic Importance' – *N3 Corridor – The N3 corridor is a critical cross border economic route which is essential to facilitate strategic traffic movement and to maintain and improve connectivity to the North-West and border region. The importance of this route is recognised in both the National Development Plan 2018-2027 and the NPF 2040*.
- Section 5.9 – MOV OBJ 45: *To work in conjunction with Cavan County Council in the planning and delivery of the N3 Virginia Bypass scheme located within the administrative area of Meath County Council. This project will be subject to the outcome of Appropriate Assessment process*.

With respect to the above, it is considered that there is a strong compatibility of the proposed scheme with the current and draft Cavan County Development Plan and the Meath County Development Plan in terms of land-use and transportation policy and objectives. Hence, it is deemed that the proposed scheme and all of its Option Corridors will have a positive impact. In terms of differentiation between options, it is deemed that all options will provide the same level of positive impact, as it is considered that all options equally align with the objectives of the Development Plans. In determining the level of positivity of the impact, it is considered that all options have a very strong compatibility with the existing and draft Cavan plans and the Meath plan, and therefore it is qualitatively assessed that a 'Moderate Positive' Impact is appropriate and all Option Corridors are allocated a Performance Score of 6.

Strategic connectivity for long distance trips

This Sub-Criterion Element is centred on the compatibility of the proposed scheme and the Option Corridors with the general objective of a National Road to cater for long-distance strategic traffic trips as opposed to localised trips. TII's PAG Unit 7.0 states:

'Strategic connectivity for long distance trips: Development on the national road network primarily aims to cater for strategic long-distance trips. This ensures investment is likely to present greater benefits regionally and nationally. It is preferable therefore that future development of the network responds to regional and national rather than local demand. The impact of the proposed scheme in catering for this demand should be reflected in the MCA. For example, projects (Options) which are expected to cater for a high proportion of local traffic should be rated negatively and the reverse for regional and national traffic'

One of the key objectives of the proposed Scheme, which align with objectives of the NPF 2040, is to improve the strategic connectivity between the Greater Dublin Area and the North-West Region. Therefore, at a high-level, it is considered that the proposed Scheme and all of its Option Corridors will have a positive impact in relation to this Sub-Criterion Element.

From the observations of the traffic model, it is concluded that the partial online option (Option A) contains a higher proportion of local traffic when compared against the offline Options (Options B – E). Therefore, in accordance with the PAG guidance, it is considered that the level of positivity of Option A is slightly downgraded relative to Options B – E, whilst still recognising that all options will have a positive impact in terms of enhancing the long-distance strategic connectivity. Therefore, it has been qualitatively assessed that Options B – E and variants have a 'Major or Highly Positive Impact' and allocated a Performance Score of 7, whilst Option A has a 'Moderately Positive' Impact and allocated a Performance Score of 6.

Mitigate risks of urban sprawl

This Sub-Criterion Element is focussed on the compatibility of the proposed scheme and the Option Corridors with the general objective of mitigating the risk of urban sprawl, which may be caused by a proposed road scheme and which in itself may also adversely affect the efficiency of the road network in the future. TII's PAG Unit 7.0 states:

'Urban sprawl is the unplanned and uneven pattern of land use development which can be driven by multitude of processes, including transport, leading to inefficient use of resources. Urban sprawl and the low-density development can put the road network under immense pressure if unchecked. It is important therefore that planning of upgrades and new links to the road network mitigate the potential for development which is likely to adversely impact on the road network. Because it is difficult to ascertain the future implication of road development in relation to urban sprawl, most projects will rank as Neutral. However, in consideration of existing land uses, and the type and location of the proposed scheme, the Appraisal Team may have reason to rank a project negatively in this regard.'

At a national level, the NPF 2040 recognises the risks and impacts of urban sprawl. As an overarching mitigation measure, it identifies Compact Growth (National Strategic Outcome 1), where it targets 'a greater proportion (40%) of future housing development to be within and close to the existing footprint of built-up areas'. The NPF also states:

'*A major new policy emphasis on renewing and developing existing settlements will be required, rather than continual expansion and sprawl of cities and towns out into the countryside, at the expense of town centres and smaller villages. '*

Options A, C and Cv2 run close to the urban centre of Virginia and provide for better connectivity of active travel facilities, and it is considered that these options could promote greater compact growth.

In terms of ribbon development along the proposed options, and the creation of further urban sprawl, it is noted that all Option Corridors as part of their compatibility with Safety Scheme Objectives will aim to prohibit the number of direct accesses onto the proposed N3, with no direct individual private accesses being permitted. Therefore, it could be considered that all options could have a potential positive impact in this regard.

Notwithstanding the analysis above, where potential positive impacts have been identified, it is noted as per TII's PAG Unit 7.0 Guidance, that it is difficult to ascertain with certainty the potential future implications and impacts of a proposed road development in relation to urban sprawl due to its complexity. Therefore, at this stage, and for the purposes of this assessment, all options have been qualitatively assessed as having a 'Neutral' Impact and allocated a Performance Score of 4.

Land Use Integration Summary

Upon the determination of individual Performance Scores (1 – 7) for each of the three Sub-Criterion Elements related to Land Use Integration, each of these scores were combined to provide a Sub-Criterion Element Total (Sum of Individual Performance Scores – out of a maximum of 21) for each Option Corridor. Thereafter, a single overall Performance Score was derived for the Sub-Criterion of Land Use Integration based on an average of their associated Sum of Individual.

Table 9-38 Land Use Integration - Performance Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Support for Local Development Plan	6	6	6	6	6	6	6	6	6	6
Strategic Connectivity for Long Distance Trips	6	7	7	7	7	7	7	7	7	7
Mitigate Risks of Urban Sprawl	4	4	4	4	4	4	4	4	4	4
Sum of Individual Performance Scores (Out of 21)	16	17	17	17	17	17	17	17	17	17
Average Score	5.3	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6	5.6
Overall Land Use Integration Performance Score	5	6	6	6	6	6	6	6	6	6

9.6.3 Geographical Integration

As part of this Sub-Criterion, the Option Corridors were comparatively assessed in terms of their performance with improving connectivity within Ireland, Northern Ireland and to Europe.

Regarding the national context, the current TII's PAG Unit 7.0 (October 2016) was published in advance of the formal publication and adoption of the National Planning Framework (NPF) 2040 and the supporting National Development Plan (NDP) 2021 - 2030. Therefore, the PAG document primarily refers to the National Spatial Strategy (NSS) 2002 - 2020, which has now been superseded in its entirety by the NPF 2040. Hence, for the purposes of this assessment and in relation to national policy, the NPF 2040 and NDP 2021 - 2030, under the umbrella of Project Ireland 2040, are deemed the most appropriate policy to compare the proposed scheme and its Option Corridors against.

In relation to the European and international context, TII's PAG Unit 7.0 outlines that the proposed scheme and its options are to be assessed against the Trans-European Transport (TEN-T) Network.

National Development Plan (NDP) 2021 -2030

The NDP 2021 – 2030, sets out ten Strategic Investment Priorities that will underpin the implementation of the NPF 2040 over a ten-year period and support the National Strategic Outcomes of the NPF 2040.

The National Road Network forms one of the Strategic Investment Priorities.

'As set out in the NPF, the Government wants to work with Northern Ireland authorities across three main dimensions:

- Working together for economic advantage;
- Co-ordination of infrastructure investment; and
- Managing our shared environment.

Working together, we can realise the full potential of the North-West, the Central Border Region, and the Dublin Belfast Corridor.'

Under Project Ireland 2040, the National Development Plan (NDP), which supports the National Planning Framework (NPF) 2040, states *'Investment in these projects'*, which included the N3 Virginia Bypass, *'contribute to the National Strategic Objectives of Enhanced Regional Accessibility and Compact Growth, connecting communities and encouraging economic activity'*.

In terms of the specific assessment of the Option Corridors, it is considered that all options will equally improve connectivity of the National Road Network, and that all options will equally improve access to the north-west identified by Project Ireland 2040 for improvement of the existing N3National Primary route. In conclusion, it is deemed that all options have a 'Major or Highly Positive' impact' in terms of the Sub-Criterion Element of 'Connectivity of the Strategic Network', and are allocated a Performance Score of 7.

Ten-T Network

The N3 is not part of the core or comprehensive Ten-T network. However, the N3 Virginia Bypass will improve the linkage from Dublin and Cork to the TEN-T comprehensive network route between Sligo, Enniskillen and Belfast (N16/A4/M1 corridor) and between Sligo, Letterkenny and Derry (N15/N14/N13 corridor).

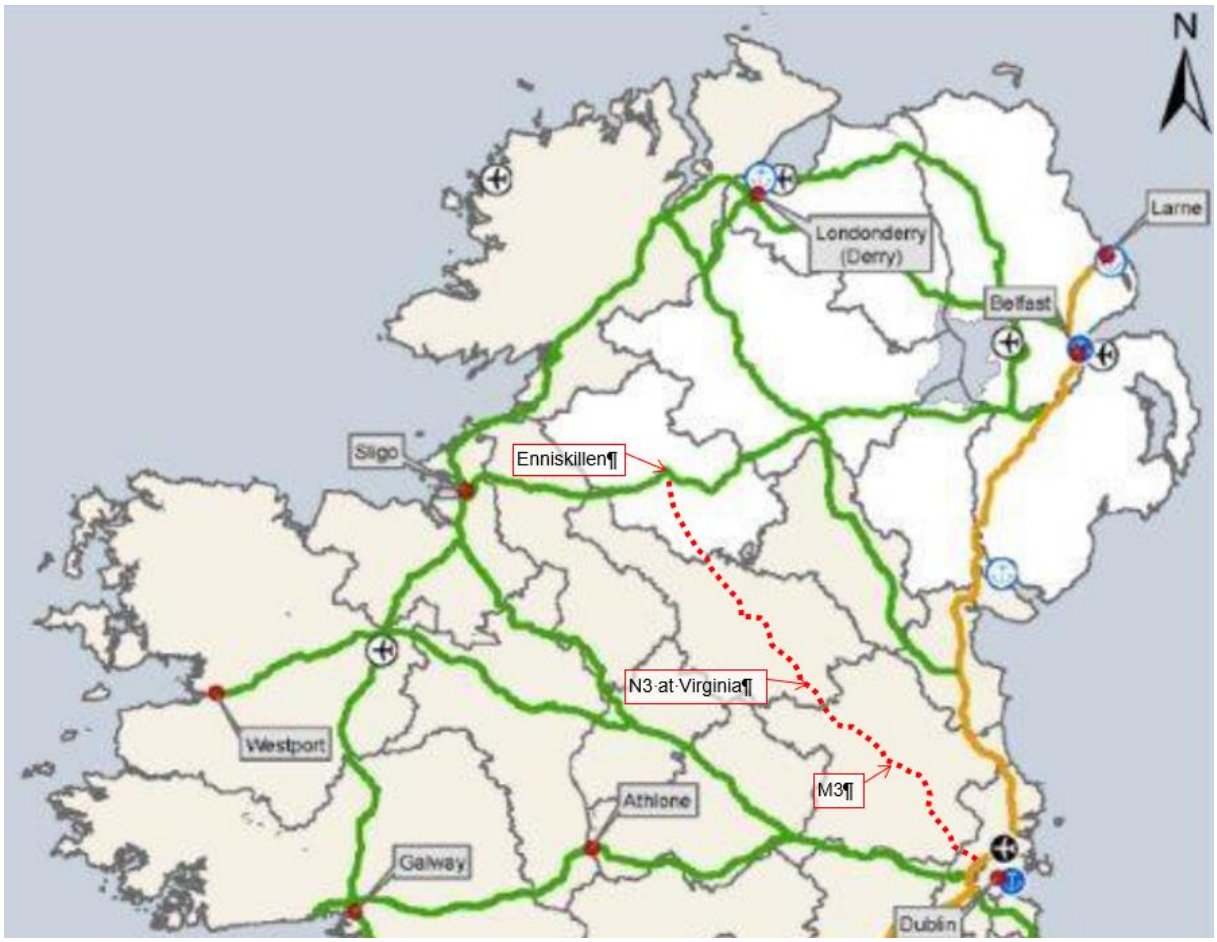


Figure 9-7 TEN-T Core and Comprehensive Network in the North and Border Region

It is considered that the proposed scheme has a minor compatibility with TEN-T Network Policy in relation to international, as well as cross-border connectivity. In terms of the Option Corridors, it is considered that all options will equally have the same minor compatibility with TEN-T's enhanced connectivity objectives.

Therefore, it is deemed that all options have 'Minor or Slightly Positive' impact and allocated a Performance Score of 5.

Geographical Integration Summary

Upon the determination of individual Performance Scores (1 – 7) for each of the three Sub-Criterion Elements related to Geographical Integration, each of these scores were combined to provide a Sub-Criterion Element Total (Sum of Individual Performance Scores – out of a maximum of 14) for each Option Corridor. Thereafter, a single overall Performance Score was derived for the Sub-Criterion of Geographical Integration based on an average of their associated Sum of Individual.

Table 9-39 Geographical Integration - Performance Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Project Ireland 2040	7	7	7	7	7	7	7	7	7	7
Ten-T Network	5	5	5	5	5	5	5	5	5	5
Sum of Individual Performance Scores (Out of 14)	12	12	12	12	12	12	12	12	12	12
Average Score	6	6	6	6	6	6	6	6	6	6
Overall Geographical Integration Performance Score	6	6	6	6	6	6	6	6	6	6

9.6.4 Other Government Policy Integration – Regional Balance

The TII Project Appraisal Guidelines Unit 7 advise that transport projects should be scored positively for regional balance if investment is:

- Within or to urban centres from peripheral regions
- On links between urban centres
- On routes which improve access to international ports and airports

The following transport projects should be regarded as neutral to regional balance:

- Links between the East and peripheral regions which do not improve international access
- Transport projects which will only improve mobility within the East region

Regarding the PAG guidance on transport projects or Option Corridors, which should be regarded as 'Neutral', these are considered non-applicable to this proposed scheme due to the following:

- The proposed Scheme will improve international connectivity for the region between the North-West to Dublin port and Dublin airports within Dublin.
- The proposed scheme lies within the Northern and Western Regional Assembly Area.

Therefore, for the basis of this assessment, the remaining Sub-Criterion Elements, which are regarded by TII's PAG Unit 7.0 to have a positive impact were considered and assessed:

- Regional Balance – Sub-Criterion Element 1 – Urban Centres Within Peripheral Regions
- Regional Balance – Sub-Criterion Element 2 – Links between Urban Centres
- Regional Balance – Sub-Criterion Element 3 – Improved Access to Maritime Ports and Airports

The consideration and assessment of these Sub-Criterion Elements is outlined in the sections below.

Regional Balance – Sub-Criterion Element 1 – Urban Centres Within Peripheral Regions

In the context of this proposed scheme, the Study Area is completely within the Northern and Western Regional Assembly Area (NWRA) and therefore resting within a peripheral region.

The proposed scheme includes one main urban centre (Virginia) coupled with a number of smaller settlements, which rest within this peripheral region. Therefore, the proposed scheme and all of the Option Corridors are equally deemed to satisfy PAG requirements of a transport Investment to urban centres, which are from a peripheral region. Hence, it has been qualitatively assessed that all options have a 'Major or Highly Positive' Impact and allocated a Performance Score of 7.

Regional Balance – Sub-Criterion Element 2 – Links between Urban Centres

The proposed scheme and all of the Option Corridors will provide an improved link between urban centres within or close to the Study Area within this peripheral region, whilst also improving the connectivity between these urban centres, to Dublin and the North-West, and to other urban centres (Cavan Town) within this peripheral region. Therefore, the proposed scheme and all Option Corridors are deemed to satisfy PAG requirements for a transport Investment on links between urban centres.

In terms of qualitatively assessing the level of positive impact for the N3 Virginia Bypass, the urban centre of Virginia, which lies within the middle of the Study Area, is a key economic hub for growth in Ballyjamesduff and Bailieborough. Therefore, the Option Corridors (Options A, C and Cv2) that include a link between the R194 to the proposed bypass are considered to have a potentially higher positive impact.

In conclusion, whilst recognising that all Option Corridors strongly achieve the PAG requirement, it is recognised that Options A, C and Cv2 have a slightly more positive impact due the better linkages with the bypass to access other urban centres more efficiently.

Therefore, it is qualitatively assessed that Options A, C and Cv2 have a 'Major or Highly Positive' Impact (Performance Score of 7), whilst the remaining Options are slightly downgraded to a 'Moderately Positive' Impact (performance Score of 6).

Regional Balance – Sub-Criterion Element 3 – Improve Access to Maritime Ports and Airports

As outlined in Section 9.6.1 (Transport Integration Sub-Criterion Element 4 – Access to Other Transport Infrastructure -Ports & Airports), the N3 Virginia Bypass options offer improvements to the road networks which will significantly reduce congestion along the N3 through Virginia and improve journey time reliability, therefore providing improved access to Dublin port and Dublin airport. Therefore, all options are deemed to be scored moderately positive and allocated a Performance Score of 6.

Other Government Policy Integration - Regional Balance Summary

Upon the determination of individual Performance Scores (1 – 7) for each of the three Sub-Criterion Elements related to Regional Balance, each of these scores were combined to provide a Sub-Criterion Element Total (Sum of Individual Performance Scores – out of a maximum of 21) for each Route Corridor Option. Thereafter, a single overall Performance Score was derived for the Sub-Criterion of Regional Balance based on an average of their associated Sum of Individual Performance Scores.

Table 9-40 Regional Balance - Performance Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Urban Centres Within a Peripheral Region	7	7	7	7	7	7	7	7	7	7
Links between Urban Centres	7	6	7	6	7	6	6	6	6	6
Improve Access to Maritime Ports and Airports	6	6	6	6	6	6	6	6	6	6
Sum of Individual Performance Scores (Out of 21)	20	19	20	19	20	19	19	19	19	19
Average Score	6.67	6.3	6.67	6.3	6.67	6.3	6.3	6.3	6.3	6.3
Overall Regional Balance Performance Score	7	6	7	6	7	6	6	6	6	6

9.6.5 Integration Appraisal Summary

Upon the determination of a single overall performance score for each of the four sub-criteria, each of these scores was added together to provide an overall Integration Appraisal performance score for each of the Option Corridors. The results of the Integration Appraisal are shown in Table 9-41 below.

Table 9-41 Integration Appraisal - Impact Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Transport Integration	7	6	7	6	7	6	6	6	6	6
Land Use Integration	5	6	6	6	6	6	6	6	6	6
Geographical Integration	6	6	6	6	6	6	6	6	6	6
Regional Balance	7	6	7	6	7	6	6	6	6	6
Overall Integration Appraisal Performance Score	25	24	26	24	26	24	24	24	24	24

9.7 Physical Activity Appraisal

The Physical Activity appraisal has been conducted in accordance with the Project Appraisal Guidelines Unit 7.0: Multi-Criteria Analysis, with guidance taken from Unit 13.0: Pedestrian and Cyclist Facilities[24]. The basis of the appraisal covers the nature of physical activity impacts of the proposed scheme, including the provision of new cyclist facilities or enhancement to existing pedestrian and / or cyclist facilities. The sub-criteria set out in this guidance as part of the Physical Activity are:

- Health Benefits
- Absenteeism Benefits
- Journey Ambience Benefits
- Changes in the number of incidents or journey times
- Other possible impacts

There is a lack of available information on the number or frequency of cyclists and pedestrians across the study area. Therefore, the standalone, quantitative assessments outlined in TII PAG Unit 13.0 are not undertaken at this stage. Furthermore, the assessments on prediction of use could not be established, nor could the associated benefits (relating to health or absenteeism) be quantitatively assessed. Therefore, the physical activity appraisal is based solely on qualitative information across:

- Health Benefits
- Journey Ambience Benefits
- Changes in Numbers of Collisions / Incidents

All known existing and proposed pedestrian and cycling facilities were identified within the Study Area as discussed in Section 9.7.1. Sections 9.7.2 to 9.7.4 appraise each Option Corridor based on the proposed pedestrian and cycling facilities for the scheme.

9.7.1 Existing and Proposed Infrastructure and Facilities

Based on local knowledge, a number of popular walking and cycling routes have been identified and illustrated in Figure 9-8 below. The figure presents a heat map showing the walking activity across Virginia with the areas of greatest activity being represented by bright colours and areas of least activity being represented by dark colours. This data was taken from the STRAVA website which collates information uploaded by users of the Strava application. For a user's activity to be shown on the map, they would have to have the Strava application installed and active on their phone or smart device. Therefore, the following maps only show a sample of the walking activity in Virginia. Additionally, Strava is very popular among exercise enthusiasts, so the majority of activity shown in the maps below is likely to be for exercise purposes rather than commuting purposes. Notwithstanding this, these maps can provide a useful insight into the preferred routes used by people walking and cycling.

It is noteworthy that there is no designated walking and cycling facility across the northern section of the town in the vicinity of the shortlisted options, hence the proposed infrastructure would be of great benefit to the area.

[24] In December 2021, PAG Unit 13.0 was updated to PE-PAG-02036 – Appraisal of Active Modes. The new Cost Benefit Analysis Tool, TEAM, has not been used for the Stage 2 Project Appraisal Matrix, but has been used on the Stage 3 Preferred Option and input into the Project Appraisal Balance Sheet.

Figure 9-8 Popular walking routes around Virginia

The scheme aims to facilitate the improvement of the urban realm in Virginia Town. All options propose a segregated pedestrian / cycle facility along the full length of the alignment that is separated from the carriageway by the provision of a verge. There is potential for connectivity from the pedestrian / cycle facility to future facilities.

9.7.2 Health Benefits

Any improvement in pedestrian and cycle infrastructure is likely to attract more pedestrians and cyclists for local trips, fitness and leisure, with the likelihood of improving health benefits. However, the inner eastern options with the Ballyjamesduff links offer better connectivity to existing footway and walking routes and with the removal of more traffic and more HGVs from Virginia Town, the options will offer safe facilities and may encourage more walking and cycling around the town.

In conclusion, considering the aspects above, and for the purposes of this comparative assessment of Physical Activity – Health Benefits, the inner eastern options of A and C and associated variants are qualitatively assessed as having a 'Moderately Positive' Impact (a Performance Score of 6), whilst the options further out from Virginia and Maghera of Option B, D and E and associated variations are assessed as having a 'Slightly Positive' Impact (a Performance Score of 5).

9.7.3 Journey Ambience Benefits

TII's PAG Unit 13.0 defines Journey Ambience Benefits, as follows:

'Journey ambience benefits are the users' perception of reduced danger (a reduced fear of potential collisions/incidents) and improved quality of journey as a result of the proposal being considered.'

Provision of a pedestrian / cycle facility segregated from traffic along the full length of the alignment with each option reduces conflict points between pedestrians / cyclists and high-speed traffic utilising the N3. This improved segregation can improve safety and subsequently increase the attractiveness of the route for walking and cycling.

It is considered that the inner eastern options with the Ballyjamesduff links offer better connectivity to existing footway and walking routes and with the removal of more traffic and more HGVs from Virginia Town, the options will offer safety facilities and may encourage more walking and cycling around the town. Options B, D and E and associated variations will not have a direct linkage into existing pedestrian facilities and therefore pedestrians will have a higher perception of danger.

In conclusion, considering the aspects above, and for the purposes of this comparative assessment of Physical Activity – Journey Ambience Benefits, the inner eastern options of A and C are qualitatively assessed as having a 'Moderately Positive' Impact (a Performance Score of 6), whilst the options further out from Virginia and Maghera of Option B, D and E and associated variations are assessed as having a 'Slightly Positive' Impact (a Performance Score of 5).

9.7.4 Changes in Numbers of Collisions / Incidents

It is noted that the general safety and security of vulnerable road users (including pedestrian and cyclists), as a Sub Criterion Element along with vehicles, has been considered within the Stage 2 Appraisal under the Main Criterion of 'Safety'. The Physical Activity Sub-Criterion 4 specifically considers the potential change in number of collisions/incidents in terms of pedestrian and cyclists only.

It is considered that all Options will bring increased safety to pedestrians and cyclists due to the provision of a separation distance between the vehicles and the pedestrian and cycle facilities, and an increased walking/cycleway width.

The majority of recorded pedestrian collisions have taken place within Virginia Town. All options will reduce traffic volumes within Virginia. However, the inner eastern options with the Ballyjamesduff links offer a significantly higher reduction in traffic, including a higher HGV reduction, from Virginia Town. The inner eastern options of A and C and associated variations are qualitatively assessed as having a 'Highly Positive' Impact (a Performance Score of 7), whilst the options further out from Virginia of Option B, D and E and associated variations are assessed as having a 'Moderately Positive' Impact (a Performance Score of 6).

9.7.5 Physical Activity Appraisal Summary

Upon the determination of a single overall performance score for each of the three sub-criteria, each of these scores was added together to provide an overall Physical Activity Appraisal performance score for each of the Option Corridors. The results of the Physical Activity Appraisal are shown in Table 9-42 below.

Table 9-42 Physical Activity Appraisal – Impact Scores Summary Table

Option	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
Health Benefits	6	5	6	5	6	5	5	5	5	5
Journey Ambience Benefits	6	5	6	5	6	5	5	5	5	5
Changes in Numbers of Collisions / Incidents	7	6	7	6	7	6	6	6	6	6
Overall Physical Activity Appraisal Performance Score	19	16	19	16	19	16	16	16	16	16

9.8 Stage 2 Project Appraisal Matrix

9.8.1 Stage 2 Project Appraisal Matrix Results

As outlined in the preceding sections, the impacts of each of the Stage 2 Options were assessed against the defined TII PAG Unit 7.0 Main Criteria, as listed below, with an associated impact score for each of the Main Criteria determined;

- Economy (See Section 9.2 above)
- Safety (See Section 9.3 above)
- Environment (See Section 9.4 above)
- Accessibility & Social Inclusion (See Section 0 above)
- Integration (See Section 9.6 above)
- Physical Activity (See Section 9.7 above)

An overall multi-criteria Project Appraisal Matrix combines the above assessments. This is represented overleaf in Table 9-43 where the impact scores under each sub-criterion are summed to give a total impact score for each option.

Table 9-43 Stage 2 Project Appraisal Matrix

	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2
ECONOMY										
Economic Benefit (TUBA - Efficiency and Effectiveness)	7	6	7	6	7	6	6	6	6	6
Wider Economic Impacts	5	4	5	5	5	4	4	4	4	4
Transport Quality and Reliability	6	5	6	5	6	5	5	5	5	5
Phasing of Construction & Funding Impacts	4	4	4	4	4	4	4	4	4	4
Sub-Total	**22**	**19**	**22**	**20**	**22**	**19**	**19**	**19**	**19**	**19**
SAFETY										
Collision Reduction	6	6	7	6	7	6	6	6	6	6
Security	7	6	7	6	7	6	6	6	6	6
Road Safety Impact Assessment	5	6	7	6	7	6	6	6	6	6
Sub-Total	**18**	**18**	**21**	**18**	**21**	**18**	**18**	**18**	**18**	**18**
ENVIRONMENTAL										
Air Quality and Climate	5	5	5	5	5	5	5	5	5	5
Noise	1	1	1	1	1	2	2	2	2	2
Landscape & Visual (including light)	1	1	1	1	1	2	2	2	1	1
Biodiversity - Flora and Fauna	3	1	1	2	2	2	2	1	1	2
Waste	3	3	2	2	3	2	2	2	2	2
Soils & Geology	3	3	3	2	3	2	2	2	2	3
Hydrology	2	2	3	4	3	4	4	3	3	4
Hydrogeology	3	2	3	3	3	2	2	3	3	3
Cultural Heritage	1	2	1	2	2	3	3	2	2	3
Non-agricultural Material Assets	3	3	3	3	3	3	3	4	3	4
Agriculture	2	1	1	1	1	2	3	2	2	2
Sub-Total	**27**	**24**	**24**	**26**	**27**	**29**	**30**	**28**	**26**	**31**

	A	B	C	Cv1	Cv2	D	Dv1	E	Ev1	Ev2	
ACCESSIBILITY AND SOCIAL INCLUSION											
Impact on deprived geographic areas	5	5	5	5	5	5	5	5	5	5	
Impact on Vulnerable Groups	5	5	5	5	5	5	5	5	5	5	
Sub-Total	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	
INTEGRATION											
Transport Integration	7	6	7	6	7	6	6	6	6	6	
Land Use Integration	5	6	6	6	6	6	6	6	6	6	
Geographical Integration	6	6	6	6	6	6	6	6	6	6	
Regional Balance	7	6	7	6	7	6	6	6	6	6	
Sub-Total	**25**	**24**	**26**	**24**	**26**	**24**	**24**	**24**	**24**	**24**	
PHYSICAL ACTIVITY											
Health Benefits	6	5	6	5	6	5	5	5	5	5	
Journey Ambience	6	5	6	5	6	5	5	5	5	5	
Changes in the number of incidents	7	6	7	6	7	6	6	6	6	6	
Sub-Total	**19**	**16**	**19**	**16**	**19**	**16**	**16**	**16**	**16**	**16**	
Total Impact Score	**121**	**111**	**122**	**114**	**125**	**116**	**117**	**115**	**113**	**118**	
Rank (for guidance only)	**3**	**10**	**2**	**8**	**1**	**6**	**5**	**7**	**9**	**4**	

9.8.2 Review of the Stage 2 Project Appraisal Matrix Results

With reference to Table 9-43 above, and as outlined in Section 6.3 (Stage 2 Appraisal Methodology and Criteria), the Options were ranked based on their Overall Option Appraisal Performance Scores.

Upon completion of the ranking, and with reference to the tables above, it is noted that Option Cv2 is ranked top with the highest Overall Option Appraisal Performance Score of 125 out of 189, and hence had the lowest impact / greatest benefit. Option B (Purple) is the lowest ranked option with an Overall Option Appraisal Performance Score of 111 out of 189, and hence had the greatest impact /lowest benefit. Thereby, there was a difference of 14 marks between the highest and lowest ranked options.

It must be emphasised that summing up of impact scores does not take account of the relative importance of each sub-criterion or the individual impacts or preferences, but provides an initial comparison between the overall, non-weighted performance of each option. A review of the appraisal summary tables clarifies that:

- The Economy assessment demonstrated that all options performed well, however the inner eastern options with the proposed R194 Ballyjamesduff Link Road and the Burrencarragh Link Road performed best, with the highest removal of traffic from within Virginia Town and carrying the higher volume of traffic on the proposed bypass option.
- The Safety assessment demonstrated that all options performed well, however the inner eastern options with the proposed R194 Ballyjamesduff Link Road and the Burrencarragh Link Road performed best, with the highest number of collision savings and the highest removal of traffic, including highest volume of HGV traffic from within Virginia Town.
- All Options will negatively impact on the environment. All options considered will reduce traffic volumes in built up areas of Virginia resulting in lowering associated traffic noise levels and pollutant emissions. It is important to note that the existing air quality in the study area is of good quality and no option will result in an exceedance of the air quality standards or pollutant concentrations limit values. The assessment identified Options B and C as the worst performing options with Options D, Dv1 and Ev2 performing with a lesser impact on the Environment. Option Cv2 was assessed as an intermediate ranked option under 'Environment' having a Moderately Negative scale of impact. By combining sections of different Option Corridors, more biodiversity impacts were avoided by Option Cv2. Option Cv2 was the joint preferred option for Air Quality & Climate, Soils & Geology, Waste and Hydrogeology.
- Accessibility & Social Inclusion assessments performed equally across all options and would not be a contributing factor to the selection of the Emerging Preferred Option.
- The Integration assessment performed well across all options. Transport Integration and Regional Balance performance performed better for the inner eastern options with the proposed R194 Ballyjamesduff Link Road and the Burrencarragh Link Road.
- The Physical Activity assessment demonstrated that all options provide a positive impact for Vulnerable Road Users, as the proposed scheme will make provision for dedicated pedestrian and cycle facilities along the route. The envisaged high reduction of traffic, including a high volume of HGV traffic, within Virginia Town for the inner eastern options ensures a safer and secure environment for vulnerable road users and therefore encourages / facilitates a better uptake towards Active Travel within the town. The inner eastern options also provide better linkage with existing walking routes in the vicinity of Virginia and Maghera.

In order to select the Emerging Preferred Option (EPO), a workshop was held on July 20th 2021 with all specialists involved in the appraisal to weigh up the individual impacts and form a view as to the likely overall impact of the options. Guided by the ranking, starting with the poorest performing, each option was individually discussed, and any arguments to keep or eliminate each option were put forward by the individual specialist and comparatively considered with any opposing views from other specialists. In addition, a pairwise appraisal was undertaken between Options C and Cv2, which performed similarly under all but environmental criteria. The pairwise assessment determined Option Cv2 had a better rating in terms of Biodiversity, primarily due to the number of crossings of the River Blackwater (3 crossings for Option C

vs 1 for Cv2). The Biodiversity specialist considers the River Blackwater to have potential for kingfisher habitat. Option Cv2 was also assessed as being of lesser impact from a waste and cultural heritage perspective. Option Cv2 therefore emerged as the option performing best, on balance, considering all impacts.

9.8.3 Refinements to the Option Corridor Width

The Option Corridor assessed at stage 2 was typically 300m wide. However following completion of Public Consultation 2 and through the Option Selection process, it was identified that variations to the option corridor width were required at the southern and northern tie-ins of the scheme and at the Burrencarragh Link Road to allow future flexibility in assessing and mitigating against potential impacts of the option.

At the southern end of the scheme an option between Option D (Orange) and Option C (Red) in the townlands of Derver in Co. Meath, Killyconny, Fartagh and Enagh in Co. Cavan was required. The additional corridor area not previously identified is highlighted in grey in Figure 9-9 below. The amendment to the option corridor is approximately 1000 metres in length and an additional 500 metres, approximately, at its widest point. The amendment is required to allow future flexibility in assessing and mitigating against potential impacts on existing property, cultural heritage sites and a seasonally flooded grassland area at Edenburt.

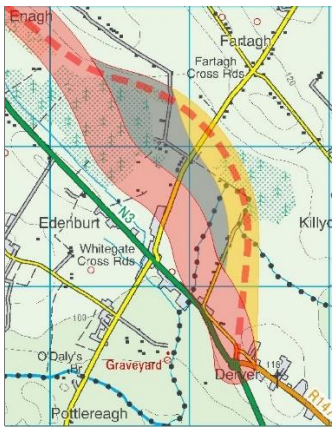


Figure 9-9 Corridor Widening at Southern End of Option Cv2

At the northern end of the scheme the corridor was also widened to allow future flexibility in assessing and mitigating against potential impacts on existing property and agricultural impacts in the vicinity of Lisgrea Cross in the townlands of Lisgrea and Cornaslieve. The wider corridor follows the alignment of Option A (Green) and the Option C variant (Red) west of Lisgrea Cross as presented at Public Consultation 2 in November / December 2020. The amendment to the option corridor is approximately 1200 metres in length and an additional 360 metres, approximately, at its widest point. An additional area between the two previous corridors is shown in grey in Figure 9-10 below.

Figure 9-10 Corridor Widening at Northern End of Option Cv2

In the vicinity of the proposed Burrencarragh Link Road, the corridor was widened to allow future flexibility in assessing and mitigating against potential impacts in the townlands of Burrenrea, Drumheel and Burrencarragh. The amendment to the link road corridor is shown grey and is approximately 780 metres in length and an additional 175 metres, approximately, at its widest point; see Figure 9-11 below.

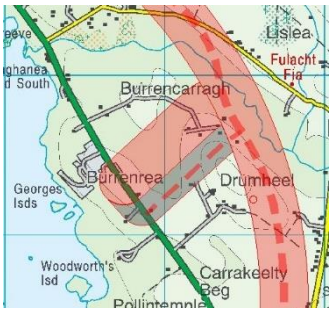


Figure 9-11 Corridor Widening at Burrencarragh Link Road

The refined alignment would avoid the seasonally flooded site at Edenburt (site 27 in Table 9-19) and thereby provide a minor improvement over the original alignment. This brings the corridor closer to the Killyconny Bog SAC and its GWDTE, but it is still more than 500m from the SAC boundary. There are no cuttings proposed in this section in the preliminary design. However, even if the detailed design results in proposed cuttings they would not impact the GWDTE as their zone of influence will be around 100m only as it is a Poor Aquifer (low transmissivity).

The refined alignment provides an improvement over the original alignment from heritage perspective. It is at a greater distance from recorded mound site CV044-012--- and its potential grouping value with the adjacent ringfort (CV044-011---); and therefore, removes measurable levels of impact on same. It also avoids a direct impact on lime kiln NIAH 40404404.

The refined alignment was assessed as having the potential of reducing any negative impact to landscape receptors and potential visual receptors around the biodiversity and heritage features of the area but has the potential of opening views to sensitive receptors to the north, yet at a greater distance than the original option.

9.9 Recommendation

With reference to Section 9.8 above and following the completion of the Stage 2 appraisal process and the Project Appraisal Matrix, a modified Option C Variant 2 (Cv2) was identified as the Emerging Preferred

Option corridor (EPO). This option is a combination of the Options D, C and A as presented at Public Consultation 2 in November / December 2020, with some localised corridor widening. Consequently, it was identified as the Emerging Preferred Option, and in accordance with TII's PAG Unit 7.0 and TII's PMM, it was recommended to progress the **modified Option Cv2**, including the R194 Ballyjamesduff Link Road and the Burrencarragh Link Road, to the next stage of the three-stage option selection process; Stage 3 (Preferred Option).

The Emerging Preferred Option corridor is approximately 14.5km in length. The corridor commences at the end of the N3 Dual Carriageway at Derver in Co. Meath and continues in a northerly direction bypassing to the east side of Whitegate Cross, east of Maghera and east of Virginia Town passing through the townlands of Derver, Killyconny, Fartagh, Edenburt, Enagh, Lisduff, Bruse, Carrakeelty Beg, Carrigabruse, Drumheel, Burrencarragh, Burrenrea, Lislea, Ballaghanea, Cornashesk, Rahardrum, Mullaghmore, Curracloghan, Aghnadrung and Murmod. After the Preferred Option Corridor crosses the River Blackwater to the north of Virginia Town, the corridor returns to follow along / adjacent to the existing N3 and continues to the northside of Lisgrea Cross, passing through the townlands of Virginia, Cornaslieve, Crannadillon, Dunancory, Lisgrea and Drumagora. Approximately 60% of the length of Preferred Option corridor follows a similar route as the '2003 N3 Virginia Bypass' scheme protected within the various Cavan County Development Plans.

Active travel provision is proposed along the mainline along its full length and associated link roads and transport park and share hubs (mobility hubs) at either end of the scheme will facilitate the transition to sustainable mobility.

Figure 9-12 below shows a layout plan of the Emerging Preferred Option Corridor (modified Option Cv2) as presented to the Public at Public Consultation 3 from 19th August 2021. The EPO drawings are also provided in Part A of Volume 2 (Drawings).

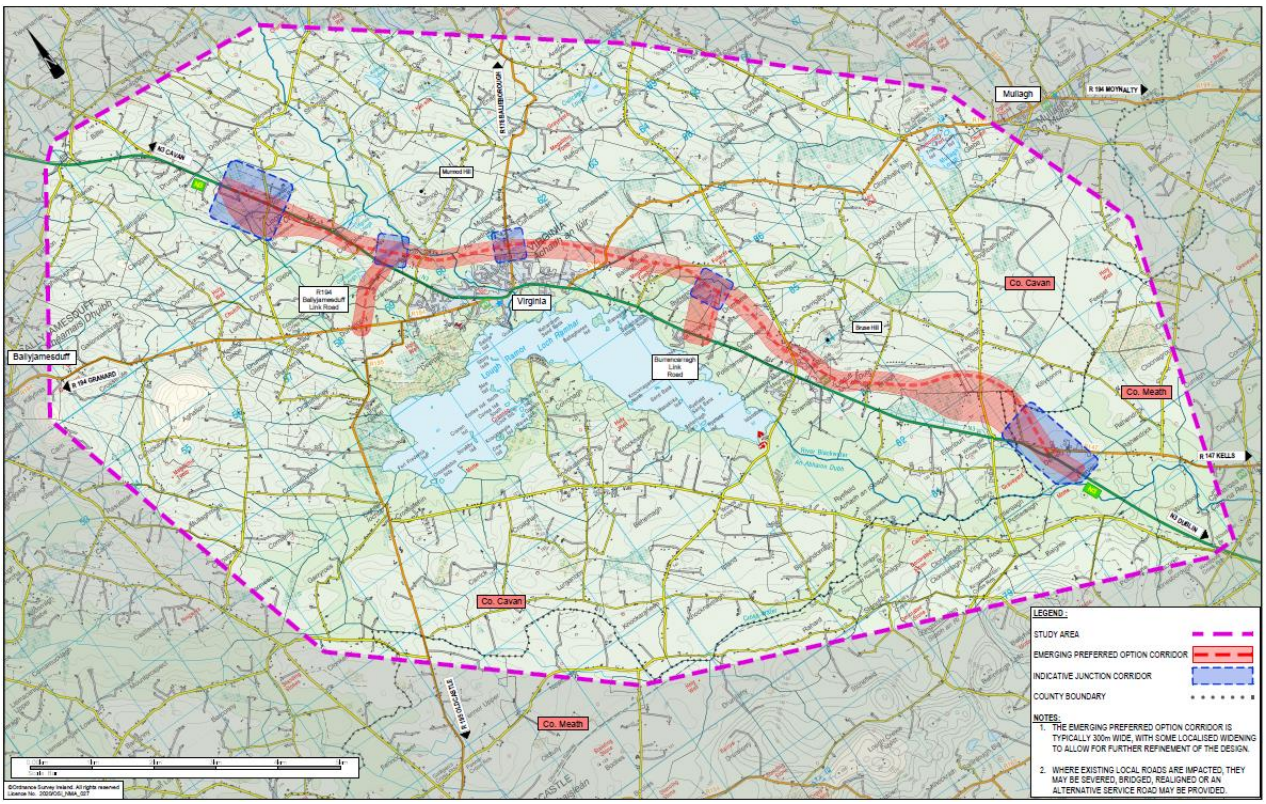


Figure 9-12 Emerging Preferred Option

SECTION 10: STAGE 3 – PREFERRED OPTION AND PREPARATION OF PABS

10.1 Introduction

Following the identification of the Emerging Preferred Option and the non-statutory public consultation (Public Consultation 3) that took place between 19th August and 13th September 2021, a Project Appraisal Balance Sheet was undertaken to assess and summarise the benefits and impacts of this option. In addition, as per TII's Design Standards, a Road Safety Audit Stage F Part 2 was undertaken on the Emerging Preferred Option.

Also, during the Stage 3 process after Public Consultation No. 3, when submissions and feedback received were reviewed and considered by the Project Team, it was determined that there was no substantially new and/or additional information which would result in an amendment to the previously presented Emerging Preferred Option (EPO) corridor. However, the junction corridor areas were reviewed and some of these areas have been amended in shape and reduced in size. In addition, corridors were developed depicting areas where side roads may be realigned, and active travel infrastructure may be provided.

The Preferred Option corridor is shown in **Figure** 10-1 below. The Preferred Option drawings are also provided in Part A of Volume 2 (Drawings).

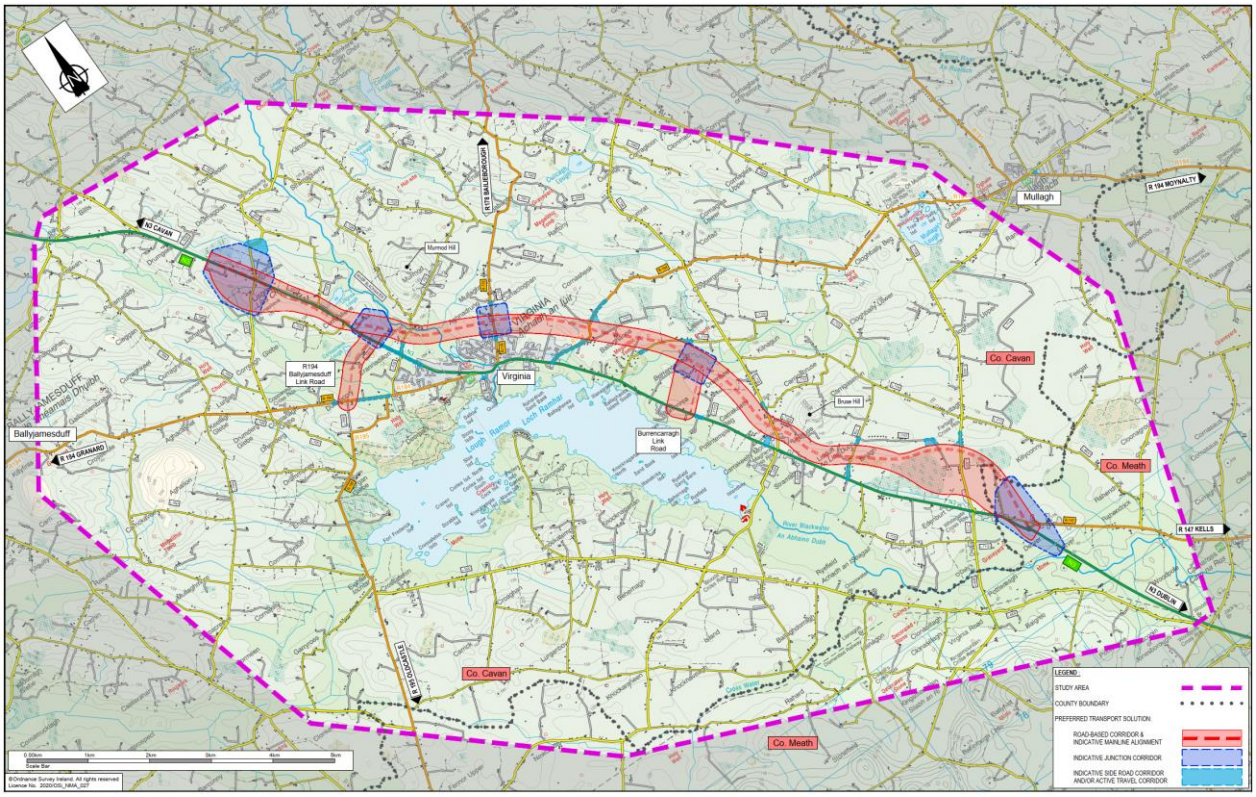


Figure 10-1 Preferred Option

10.2 Project Appraisal Balance Sheet

Following identification of the Emerging Preferred Option, a Project Appraisal Balance Sheet (PABS), in accordance with TII PAG Unit 7.1 – Project Appraisal Balance Sheet (October 2016), was undertaken to assess and summarise the benefits and impacts of this option. The PABS is a standardised Microsoft Excel

spreadsheet, which is applicable to all proposed National Road Schemes in Ireland, where the impacts of the Preferred Option against the headings of Economy, Safety, Environment, Accessibility & Social Inclusion, Integration, Physical Activity are entered, and the Overall Scale of Impact is calculated by the spreadsheet and presented along with its benefits in a summary sheet.

The PABS is made up of four sections as follows:

- Part A: This section contains general information on the project.
- Part B: This section deals only with the environmental appraisal of the project. A summary rating of the scale of impact on each environment element is included. At the end of the spreadsheet, a summary ranking for the Environment section is automatically generated based on the individual scales included for each element.
- Part C: This section includes each of the remaining five appraisal criteria namely Safety, Physical Activity, Economy, Accessibility & Social Inclusion, Integration.
- Part D: This section is the PABS Summary Sheet which is automatically populated based on Part A, B and C inputs.

A copy of the Project Appraisal Balance Sheet is contained in Volume 7, and a summary is outlined in the sections below.

10.2.1 PABS Part A

Part A of the PABS contains general project information namely the project title, project reference number, project contact details and a brief description of the project.

10.2.2 PABS Part B

Part B of the PABS deals with the Environmental appraisal of the project. The environmental assessments summarised in Section 9.4 above are used in the compilation of Part B. The overall scaling statement when all environmental disciplines are considered is **Moderately Negative**. A summary of the individual environmental impacts is given in Table 10-1 below:

Table 10-1 PABS Environmental Sub-Criteria Summary

Sub-Criteria	Scaling Statement
Air Quality and Climate	Slightly Positive
Noise and vibration	Highly Negative
Waste	Slightly Negative
Landscape & Visual Amenity (incl Light)	Highly Negative
Biodiversity, Flora & Fauna	Moderately Negative
Agriculture	Highly Negative
Non-Agricultural Properties	Slightly Negative
Architectural, Archaeological & Cultural Heritage	Moderately Negative
Soils & Geology	Slightly Negative
Hydrology	Slightly Negative
Hydrogeology	Slightly Negative

10.2.3 PABS Part C

Part C of the PABS deals with the remaining five criteria for assessment namely Safety, Physical Activity, Economy, Accessibility & Social Inclusion and Integration.

Safety

Safety considers two principal road safety impacts, accident reduction and security of road users. There is strategic traffic transferred on to a newer safer road and a HGV / axle ban removing HGV traffic from the town centre for the inner eastern options. This will have a **Highly Positive** impact in collision reduction. The segregated pedestrian / cyclist facilities being provided as part of the scheme will enhance the security of vulnerable road users, providing a **Highly Positive** impact

The overall scaling statement in terms of safety is **Highly Positive**.

Economy

The key measure of economic efficiency is the BCR, which shows how projects could increase overall welfare after allowing for the cost of implementation of the project. The Preferred Option with the alternative scenarios assessment has a positive BCR.

However, the BCR does not capture all potential economic benefits of a project. It is anticipated that this project will improve Wider Economic Benefits by reducing congestion and HGV traffic through Virginia Town centre. This will contribute to the urban regeneration and attract inward investment to the area.

The Scheme has a **Slightly Positive** impact regarding competition in the market, **Moderately Positive** impact regarding inward investment, **Highly Positive** impact regarding urban regeneration and **Neutral** impact in terms of agglomeration and labour supply.

The overall scaling statement in terms of Economy is **Moderately Positive** to take account of a positive BCR.

Accessibility and Social Inclusion

For Deprived Areas, the option has a **Slightly Positive** impact score as it will facilitate some less congestion and alternative modal choice on trips to and from areas of disadvantage.

For Vulnerable Groups, the option has a **Slightly Positive** impact score as the scheme provides improved access to the strategic road infrastructure. This has the potential to allow for more efficient and safer accessibility for Vulnerable Groups to Virginia, where higher concentrations of employment opportunities, and essential services (medical, education, commercial, etc.) can be accessed. Removal of congestion through Virginia will also greatly improve journey time reliability to Cavan and Dublin Hospitals.

The overall scaling statement in terms of Accessibility and Social Inclusion is **Slightly Positive**.

Integration

The option improves the strategic road network, bypassing the existing congested N3 through Virginia, Maghera and Whitegate, provides better connectivity to the bus service and bus time reliability and it includes sustainable pedestrian and cycle facilities.

It is specifically outlined as a priority in local and County Development Plans, it removes the town congestion from north / south N3 trips, and doesn't encourage urban sprawl. It has a **Highly Positive** impact in terms of transport integration and **Moderately Positive** impact in terms of Land Use integration.

The option has a **Moderately Positive** impact for Geographic Integration considering the proximity to the Northern Ireland Border and links with the Ten-T network. The bypass will improve journey time reliability between Dublin and Cavan, the Border and the North-West Region meeting the NPF outcome of Enhanced Regional Accessibility and is a listed scheme in NDP (2021-2030), resulting in a **Highly Positive** score for Other Government Policy Integration.

Overall, the option has a **Highly Positive** impact score.

Physical Activity

The Assessment of Alternatives Report (Appendix E of the Options Appraisal Report) recommends that the project should proceed with a hybrid multi-modal transport solution which comprises potential road, bus, demand management, active travel facilities and transport park and share hubs (mobility hubs) on the basis of the assessment presented in the report.

In order to establish the type of Active Travel provision, the project team identified the key trip attractors within the locality that could be accessed by Active Travel modes if suitable facilities were put in place. There is currently little evidence of pedestrian and cycle demand to these key trip attractors as pedestrian / cycle facilities are either non-existing or of poor quality.

The key trip attractors in the vicinity of the Preferred Option Corridor include, but are not limited to:

- Shop / Garage in Whitegate settlement
- Maghera settlement
- Maghera GAA club
- Carrigabruise National School (116 pupils)
- Shops / Garages in Maghera settlement
- 1 large Transport business (Virginia Transport)
- 3 no large factories (Glanbia & Fleetwood Paints on the south side of Virginia and AW Ennis in Maghera)
- Virginia town
- Community Facilities in Virginia
  - Churches; Lurgan (Church of Ireland) and Church of Mary Immaculate (Roman Catholic)
  - Ramor Theatre, Virginia Civic Centre & Library
  - Virginia National School (St Marys) (457 pupils)
  - Virginia Secondary School (Virginia College) (810 pupils)
  - Virginia Community Health Centre
- Hotels in and around Virginia
- Sports Facilities around Virginia
  - GAA, Soccer, Rugby clubs
  - Virginia Golf Club
- Lough Ramor
- Deerpark Forest Walk
- Local walking routes in and around Virginia

As many of the key trip attractors listed above are along the existing N3 consideration was given to the feasibility of constructing Active Travel facilities along the existing N3, as noted below:

The existing N3 between Maghera and Virginia to the south and between Virginia and Cornaslieve to the north has a narrow undulating carriageway with no hard shoulders or verges. There are numerous existing junctions and direct private accesses along the N3 and there would be no scope to provide active travel facilities without the acquisition of lands and significant impacts on properties. Any proposed Active Travel facilities would also have to take account of the numerous accesses and junctions along the route.

Where there are existing hard shoulders, between the Derver roundabout and Maghera and between Cornaslieve and Lisgrea, provision of Active Travel facilities in the shoulder would not provide the required separation distance to the carriageway. In addition, removal of the hard shoulder would reduce the capacity of the existing N3 that is already operating above capacity for the volume of traffic travelling along it. Additional lands would need to be acquired along these sections of N3 to provide Active Travel facilities.

Active Travel facilities along the existing N3 would therefore not be feasible without significant land acquisition and there would remain significant conflict points at direct accesses and junctions along the facility. Therefore, the Preferred Option and associated link roads will include Active Travel facilities that are integral with the scheme.

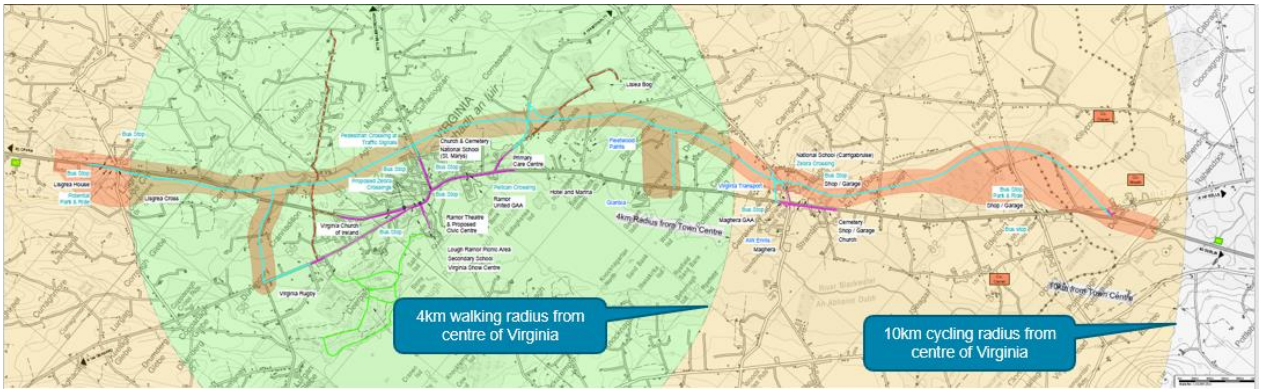


Figure 10-2 Proposed Active Travel extents and connectivity

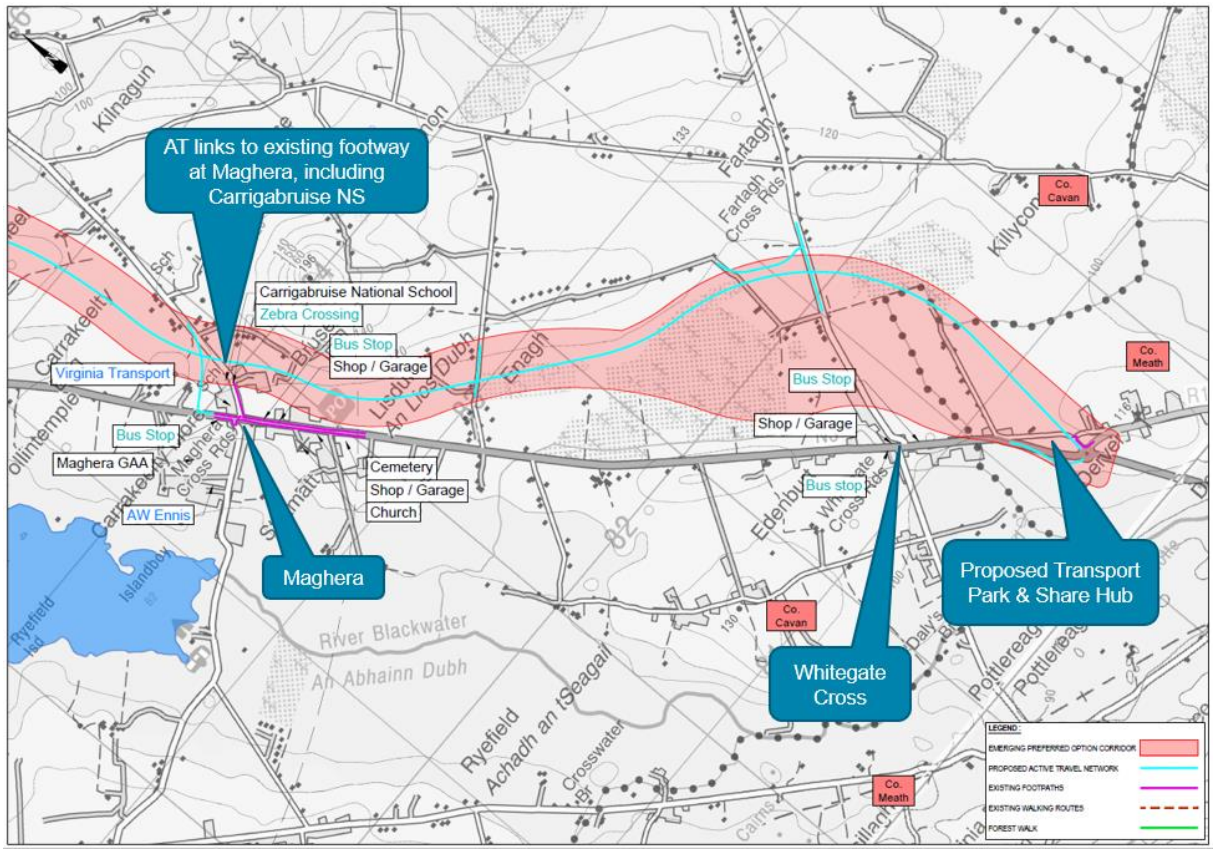


Figure 10-3 Proposed Connectivity at the Southern End of Scheme

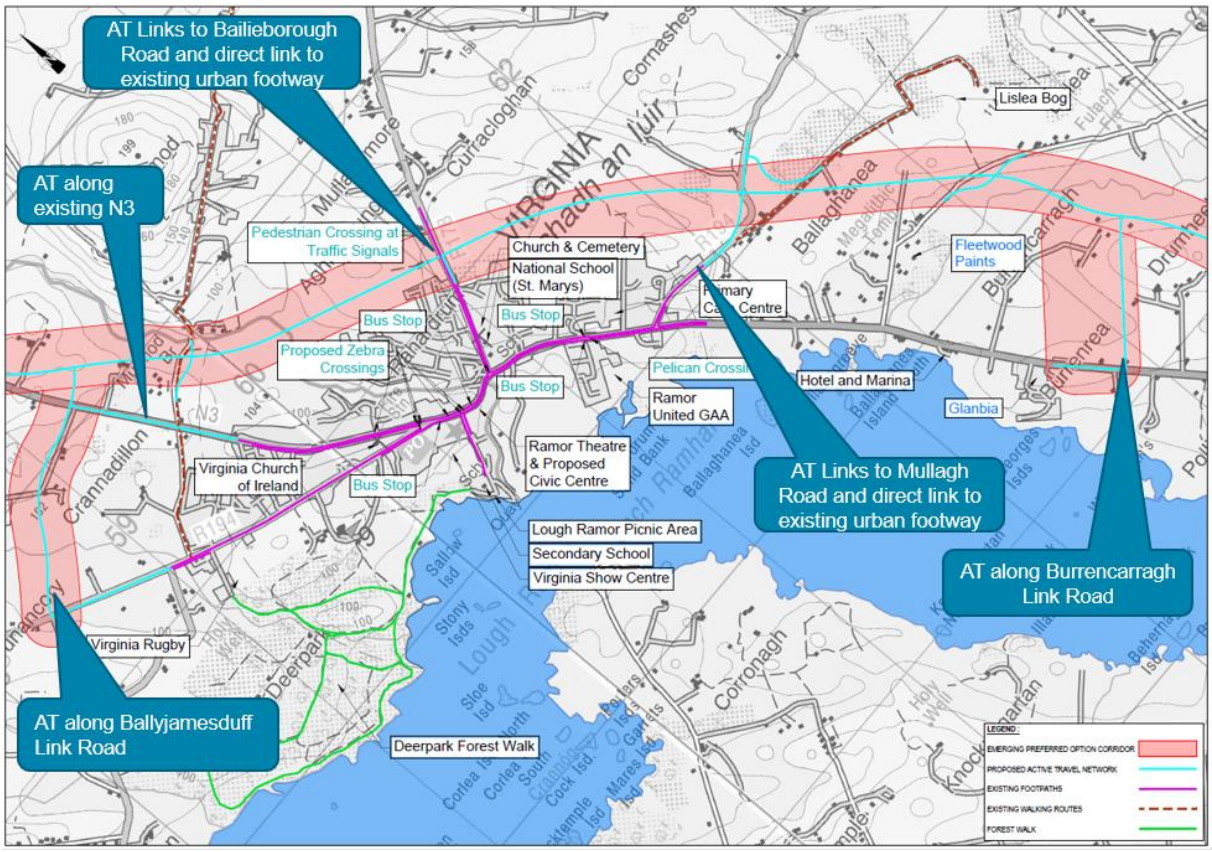


Figure 10-4 Proposed Connectivity at Virginia

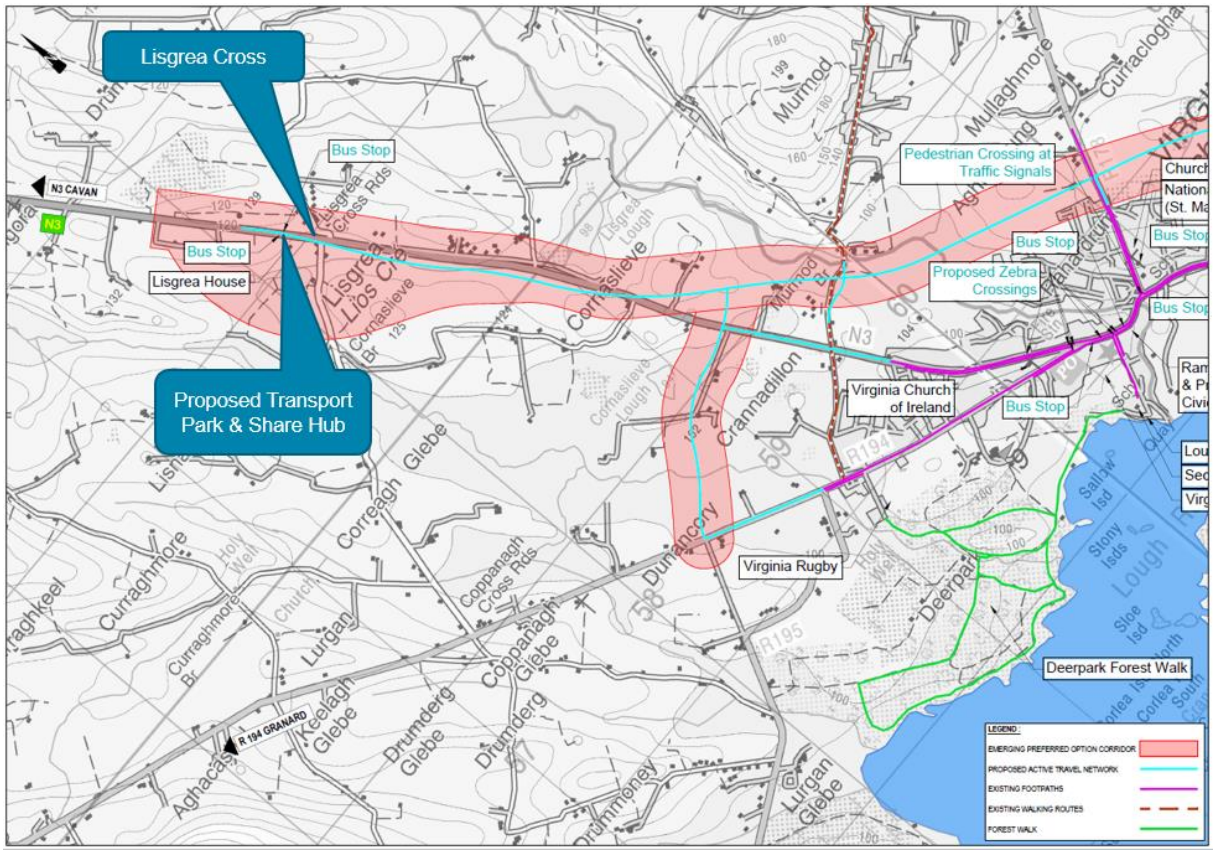


Figure 10-5 Proposed Connectivity at the Northern End of Scheme

The proposed alignment for the scheme provides excellent connectivity to a number of the key trip attractors listed above including:

- Carrigabruise National School
- Maghera settlement
- Maghera GAA club
- 1 large transport business (Virginia Transport)
- 3 no large factories (Glanbia & Fleetwood Paints on the south side of Virginia and AW Ennis in Maghera)
- Virginia town
- Church of Mary Immaculate
- Virginia National School (St Marys)
- Local walking routes in and around Virginia

The removal of a high volume of traffic from the existing N3, and in particular Virginia Town and the settlements of Maghera and Whitegate, will enable improvement of the public realm environment and facilitate improvements for walking and cycling that will provide a safer and healthier environment for travel to:

- Shop / Garage in Whitegate settlement
- Maghera GAA club
- Shops / Garages in Maghera settlement
- Virginia Secondary School (Virginia College)
- Virginia Community Health Centre
- Lurgan Church of Ireland
- Ramor Theatre, Virginia Civic Centre & Library
- Hotels in and around Virginia
- Sports Facilities around Virginia
  - GAA, Soccer, Rugby clubs
  - Virginia Golf Club
- Lough Ramor
- Deerpark Forest Walk

Where the Preferred Option crosses existing local roads, direct connectivity between the local road and the proposed Active Travel facilities will be investigated to allow other local communities to benefit from the Active Travel facilities.

In May 2022, TII launched a public consultation for the development of a new National Cycle Network (NCN), a planned core cycle network of 3,500km which will criss-cross the country connecting more than 200 villages, towns and cities. The National Cycle Network will include cycling links to transport hubs, education centres, employment centres, leisure and tourist destinations, and support “last mile” bicycle deliveries. An extract of the proposed NCN is shown in Figure 10-6 below.

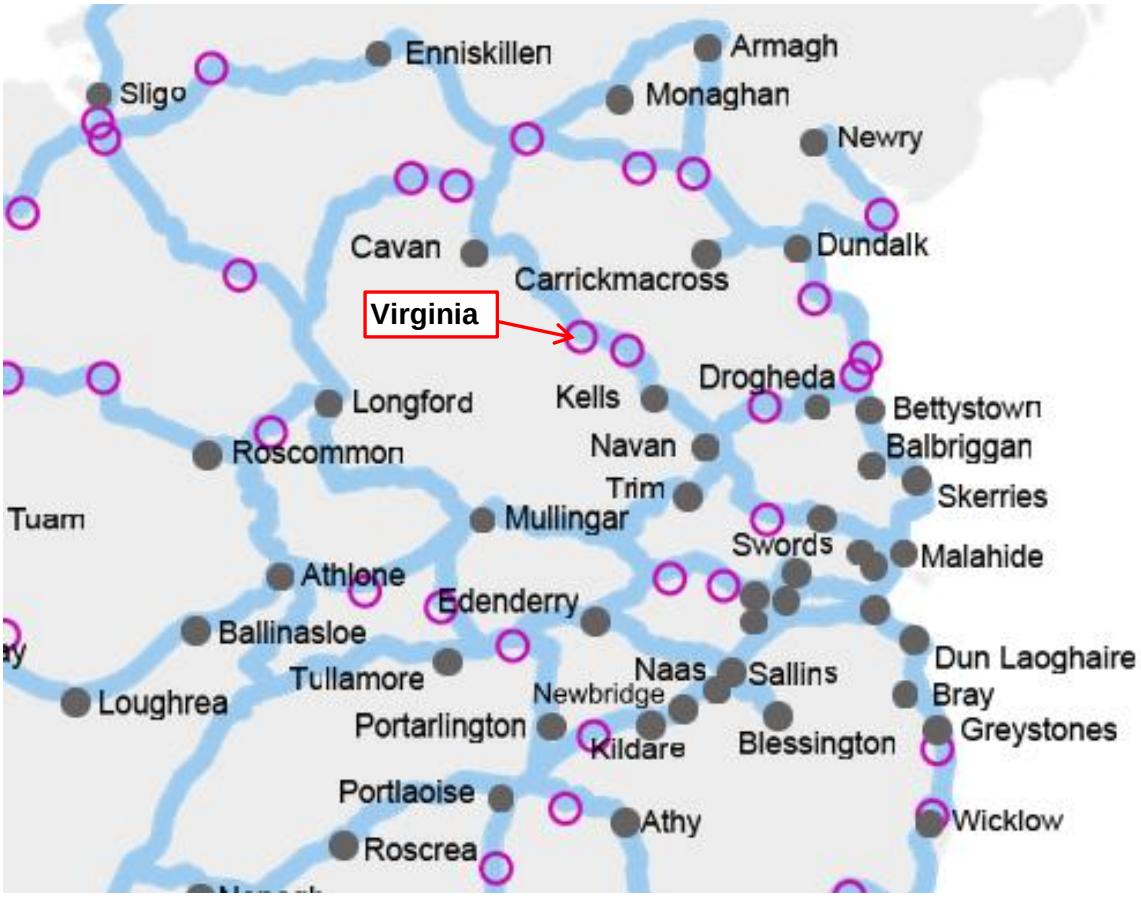


Figure 10-6 Extract of the proposed National Cycle Network with Virginia Town noted.

In September 2022, the National Transport Authority (NTA) launched a public consultation for CycleConnects: Ireland's Cycle Network Programme. The draft proposal builds on the plans already developed for the Greater Dublin Area and aims to create a cycling network across the remaining 22 counties. The NTA proposals are in line with Action 28 of the Government's "National Sustainable Mobility Action Plan 2022-2025". They were developed following consultation with all local authorities and align with Transport Infrastructure Ireland's proposed National Cycle Network.

Figure 10-7 below shows the proposed NTA CycleConnects network plan for County Cavan, with the purple lines representing the interurban network, that is classified as an "On-road cycle route to link all key settlements and destinations outside urban areas". Figure 10-8 shows an excerpt of the Cavan plan, focused on Virginia and environs. Figure 10-9 is an extract from Figure 3.1 of the Technical Note accompanying the maps for the cycle network. The figure shows existing trails, planned future greenways and other Active Travel measures and completed greenways. Included in the figure is a proposed alignment for Active Travel facilities associated with the N3 Virginia Bypass scheme (shown in dashed blue line and denoted N).

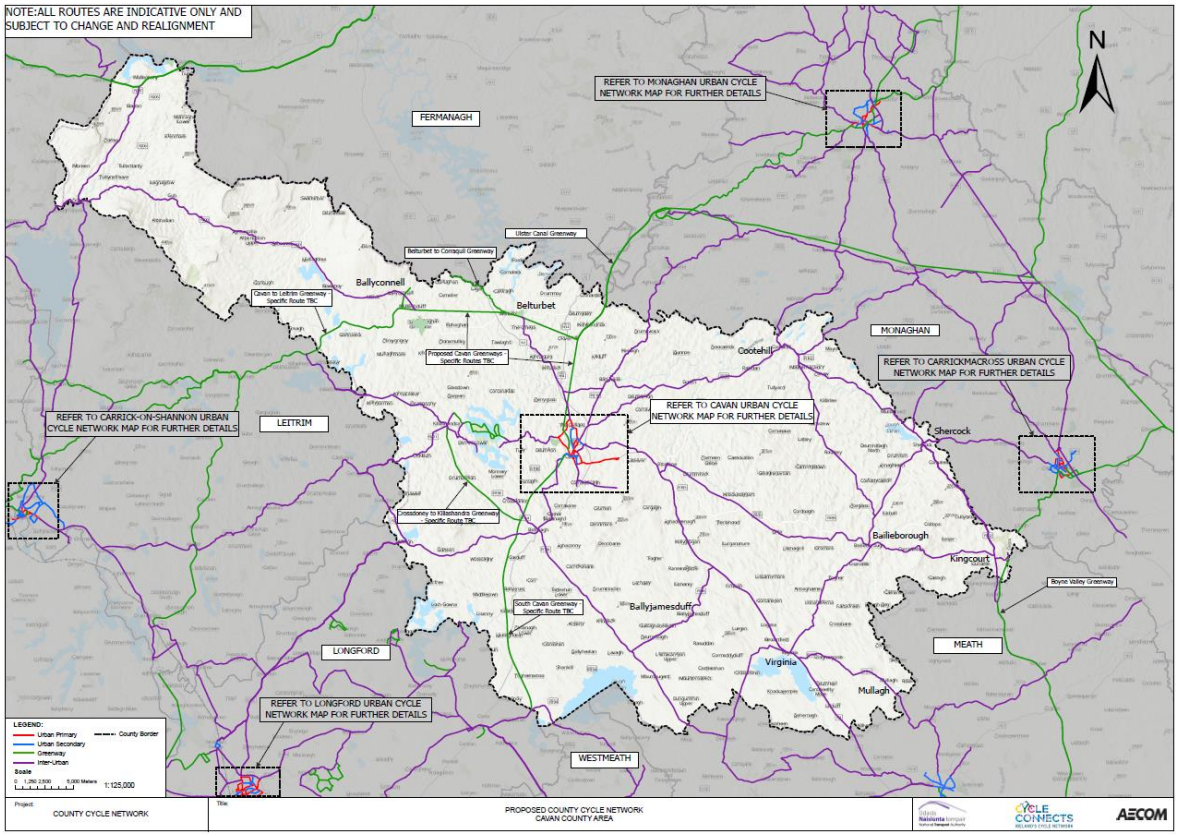


Figure 10-7 Public Consultation Drawing of the proposed CycleConnects Network for Cavan

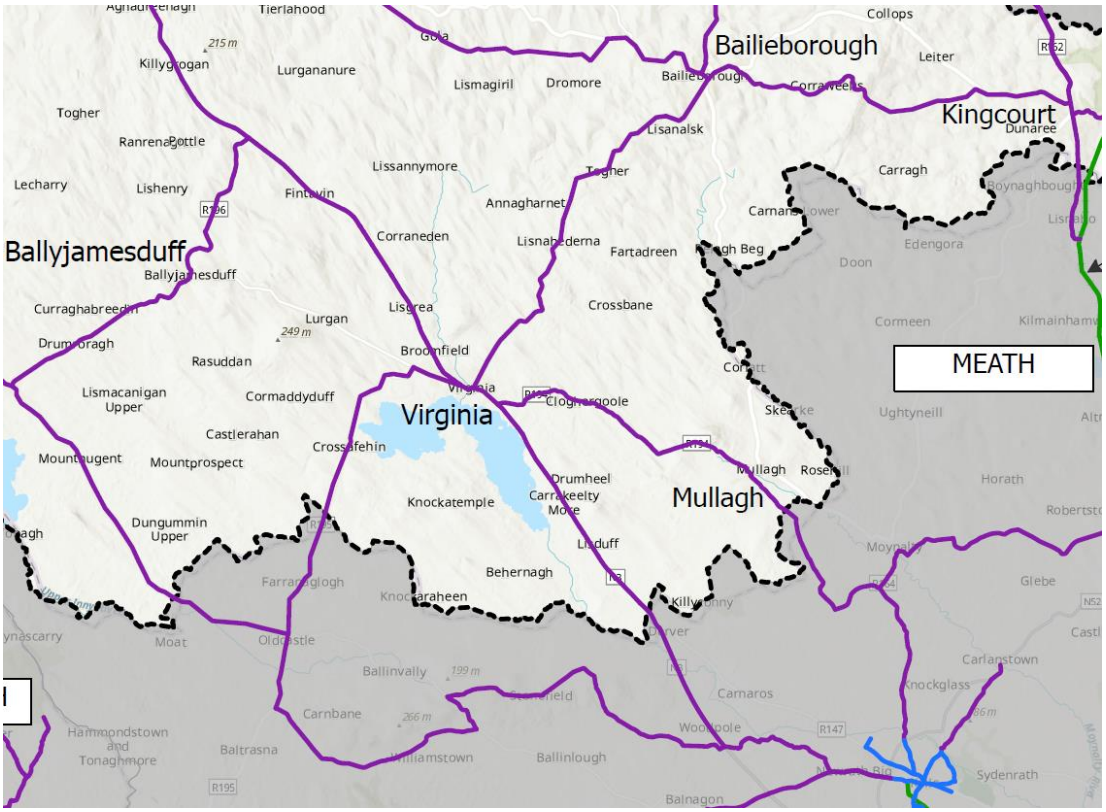


Figure 10-8 Extract from Public Consultation Drawing of the proposed CycleConnects Network showing Virginia and Environs

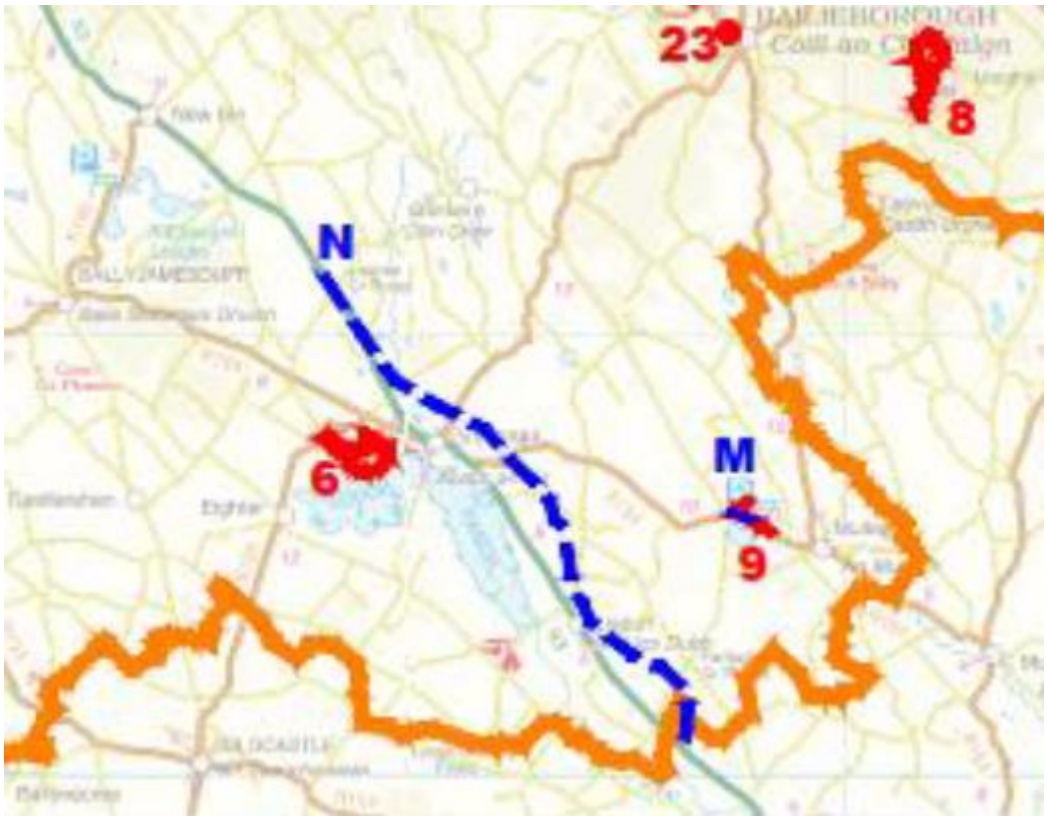


Figure 10-9 Extract from Figure 3.1 of the Technical Note for the draft Cavan Cycle Network showing the proposed Active Travel facility associated with the N3 Virginia Bypass scheme

Whichever cycle network plan progresses between Kells and Cavan, i.e. TII National Cycle Network or NTA CycleConnects Network, the Active Travel facilities proposed along the full extents of the N3 Virginia Bypass scheme can provide approximately 14.5km Active Travel facilities along either of the proposed cycle networks. Future Active Travel schemes could be developed to extend from the southern and northern ends of the Scheme to form other sections of the Kells to Cavan cycle network in County Cavan and County Meath.

In the intervening period, the proposed N3 Virginia Bypass Active Travel facilities will terminate as follows:

- Southern end at the Derver Roundabout
  - The Active Travel facilities are to tie into a proposed transport park and share hub (mobility hub) incorporating bus stops at Derver. The existing R147 to Kells has some sections of hardstrip / hard shoulder / wide verges that could be improved under other schemes to extend Active Travel facilities into Kells.

- Northern end at Lisgrea Cross
  - The Active Travel facilities are to tie into a proposed transport park and share hub (mobility hub) incorporating bus stops at Lisgrea. The existing N3 continues to Cavan as a single carriageway with hard shoulders.

- Ballyjamesduff Link Road
  - It is proposed to extend the Active Travel facility to tie in directly with the existing footways at Dunancory river bridge, that continues into Virginia Town centre.
  - It is proposed to extend the existing footways on the existing N3 on the edge of Virginia Town to the proposed link road junction with the existing N3.

- Burrencarragh Link Road
  - It is proposed to extend the Active Travel facility from the proposed link road junction with the existing N3 in a northerly direction for approx. 300m.

In December 2021, the TII updated PAG Unit 13.0 - Pedestrian and Cyclist Facilities (PE-PAG-02036). This new unit provides updated guidance on the appraisal of active modes schemes. The guidance covers the appraisal of stand-alone active modes schemes or the appraisal of active mode components of wider national roads schemes. A key component of this guidance document is a new economic appraisal tool for active modes called TEAM. This economic appraisal was undertaken on the Preferred Option and the economic outputs added to the PABS.

Demand Scenario

As there was no reliable baseline data readily available for walking and cycling in proximity to the Preferred Option, the Demand Scenario inputs for the TEAM tool was estimated from an approximation of the population catchment and the application of standard trip rates as per Section 5.3.3 of PAG 13.

Population Catchment

The population catchment area included all properties within 500m of the facility, as shown in Figure 10-10 below. The boundary was widened to cover the central town area and take into account existing footpaths and walking routes. Residents outside this area are considered to be unlikely to use the facility, and were excluded from this assessment.

The total population within the area was extracted from the 2016 census Data on GIS and was 2,648. This total was projected to 3,079 for the current 2022 scenario based on the projected growth for Virginia included in the Draft Cavan County Development Plan 2022-2028.

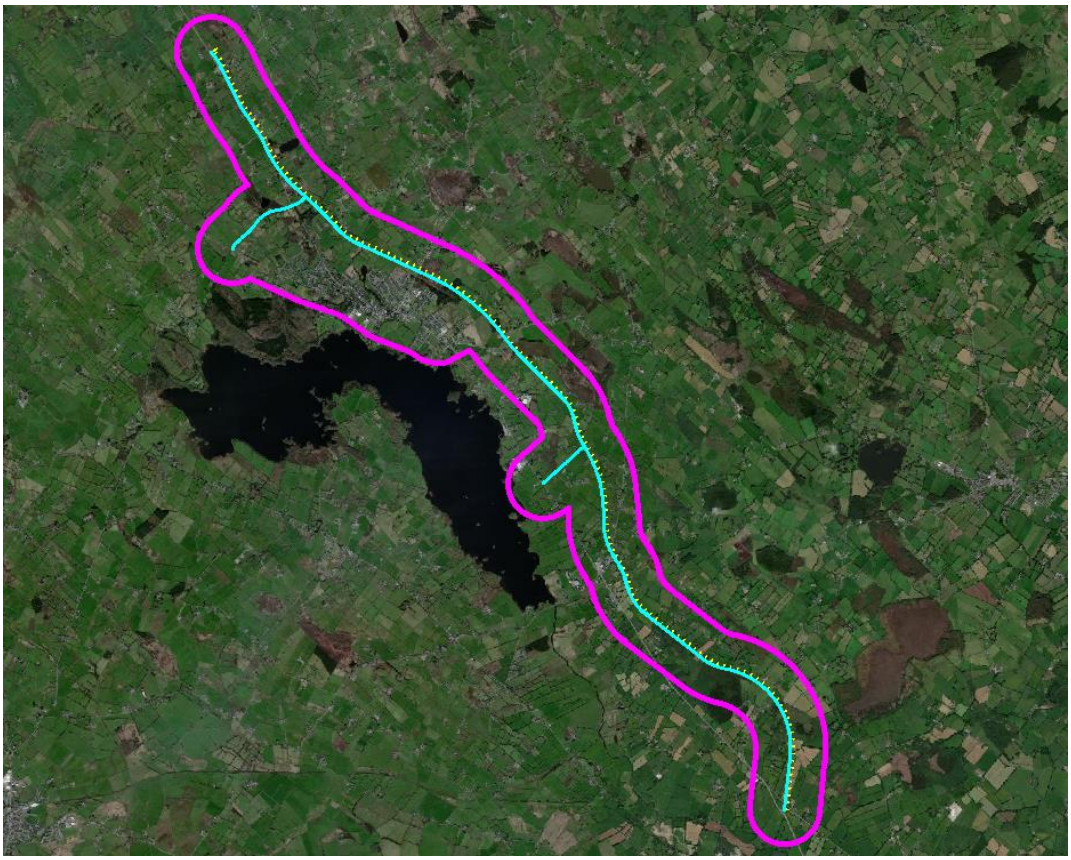


Figure 10-10 Population Catchment Area

Standard Trip Rates

Based on Table 5.1 in PAG 13, Virginia (other urban districts with a population of between 1,500 and 10,000), would generate 63.1 walking trips and 4.3 cycling trips daily per 100 residents for utility purposes. Based on Table 5.2 in PAG 13, 37 walking trips and 5 cycling trips would be generated daily per 100 residents for recreational purposes. However, not all of the standard trips will utilise the proposed facility as there are current existing footways which may be more desirable on a case-by-case basis. Therefore, a conservative estimation of 10% of all utility trips and 50% of all recreational trips were assumed to use the proposed facility. These figures were adopted as the Low Scenario for the Demand Scenario input. The central and high scenario were factored by 1.1 and 1.2 respectively based on the target growth in the Draft Cavan County Development Plan 2022-2028.

TEAM Results

The breakdown of the Present Value of Benefits are shown as a pie chart in Figure 10-11 below:

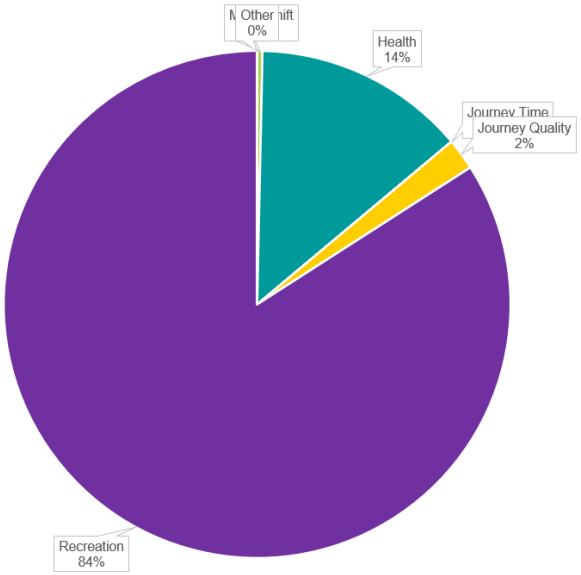


Figure 10-11 Active Travel Benefits

The overall scaling statement in terms of Physical Activity is **Highly Positive**.

10.2.4 PABS Part D

Part D of the PABS is a summary statement of the assessment which is compiled based on the input to Parts A, B, and C. The assessment is carried out under six criteria. The scaling statements of the PABS for the N3 Virginia Bypass scheme are shown in Table 10-2 below.

Table 10-2 PABS Summary

Criteria	Scaling Statement
Economy	Moderately Positive
Safety	Highly Positive
Environmental	Moderately Negative
Accessibility & Social Inclusion	Slightly Positive
Integration	Highly Positive
Physical Activity	Highly Positive

In terms of environment, it is noted at this stage of the scheme development and for this appraisal, appropriate mitigation measures do not form part of determination of impact. As part of subsequent TII PMG Phase 3 (Design and Environmental Evaluation), an Environmental Impact Assessment (EIA) will be undertaken, where appropriate mitigation measures will be identified and developed, along with routing and design optimisation to avoid particular sites, where feasible. Thereafter, the environmental impacts will be reassessed in the context of post-mitigation, with the likely potential that the impact level of some environmental criteria may reduce.

The economic assessment has demonstrated that, based on the scheme costs developed to date and the associated forecast performance of the transport network, the proposed option represents value for money, with a positive Benefit to Cost Ratio.

10.3 Alignment of Preferred Option with Policy Objectives

10.3.1 European Policy

TEN-T Network Policy

While the N3 Virginia Bypass scheme does not form part of the TEN-T network, it will improve linkage and connectivity from Dublin and Cork to the TEN-T comprehensive network route between Sligo, Enniskillen and Belfast (N16/A4/M1 corridor) and between Sligo, Letterkenny and Derry (N15/N14/N13 corridor).

10.3.2 National Policy

National Planning Framework (NPF) 2040

The National Planning Framework (NPF) – Project Ireland 2040 includes a list of 'shared goals' across the country framed as 10 National Strategic Outcomes (NSOs). The NSOs are described in Section 2.2.2 of this report. The N3 Virginia Bypass will improve connectivity by reducing journey times and improving journey time reliability. This in turn will make Cavan and the North-West region a more attractive place to set up business and improve the economic resilience of the county and the region. It will also benefit existing businesses by reducing transport times and costs. The scheme will also facilitate a transition to sustainable mobility with the provision of the following:

- Active Travel infrastructure, incorporating pedestrian and cycle facilities; and
- Transport Park and Share Hubs (mobility hubs), that will provide for parking to safe bus stops and facilitate more carpooling for longer onward journeys, with EV charging facilities and with safe HGV rest parking areas.

It is considered that the Preferred Option will therefore align with NSOs 1 to 6 (Compact Growth, Enhanced Regional Accessibility, Strengthened Rural Economies and Communities, Sustainable Mobility, A Strong Economy Supported by Enterprise, Innovation and Skills and High-Quality International Connectivity) of the NPF.

National Development Plan (NDP) 2021 to 2030

The N3 Virginia Bypass aligns with the NDP priorities by removing strategic traffic from Virginia Town and thereby increasing reliability and journey times on the public transport system while improving safety on the National Road Network. Removing the strategic traffic, including HGVs, from the town centre and the settlements of Whitegate and Maghera will help achieve a more comfortable and safer environment when walking or cycling to and from work, home, school, shops and leisure. The inclusion of Active Travel measures and the proximity of the scheme to the town, which encourages compact growth, as well as the inclusion of the Transport Park and Share Hubs (mobility hubs) to facilitate the transition to sustainable mobility, further aligns with the priorities of the NDP.

National Investment Framework for Transport in Ireland (NIFTI)

NIFTI establishes four Investment Priorities: Decarbonisation, Protection and Renewal, Mobility of People and Goods in Urban Areas, and Enhanced Regional and Rural Connectivity. Decarbonising the transport sector is an urgent priority in the context of Irelands climate change targets and NIFTI recognises the importance of this challenge by setting out to prioritise sustainable modes of Active Travel and Public Transport over less sustainable modes such as the private car. NIFTI has developed a hierarchy of four intervention types to make best use of the existing asset and to ensure that investment is proportionate to the problem identified; Maintain, Optimise, Improve and New.

To ensure alignment with NIFTI, an Assessment of Alternatives was undertaken that demonstrated that Active Travel and Public Transport alone, as well as maintaining, optimising and improving the existing N3, will not resolve the traffic congestion and unsafe environment for VRUs in Virginia and in the settlements of Maghera and Whitegate. The proposed N3 Virginia Bypass scheme developed as a hybrid multi-modal transport solution will align with Tiers 1 and 3 of the NIFTI Modal hierarchy and Tier 4 of the NIFTI intervention hierarchy. The removal of strategic traffic from the town will also enable measures to achieve alignment with Tier 2 (Demand Management) and Tier 3 (Active Travel) of the NIFTI intervention hierarchy.

Town Centre First Policy

The N3 Virginia Bypass scheme will align with the Town Centre First Policy through a reduction in traffic congestion and traffic noise levels, and improvement in air quality in Virginia and its environs, due to the removal of strategic traffic, including HGVs, along the N3 through Virginia Town, Maghera and Whitegate. This will improve the public realm in the town centre and make the town more amenable for other modes of transport.

Zero Pollution Action Plan, Climate Action Plan 2021 and Climate Action and Low Carbon Development Acts 2015 to 2021

The Climate Action Plan 2021 provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and setting us on a path to reach net-zero emissions by no later than 2050, as committed to in the Programme for Government and set out in the Climate Act 2021.

The proposed N3 Virginia Bypass project will ease congestion in the town of Virginia and provide an opportunity to improve public realm facilities and road safety for vulnerable road users through the provision of dedicated cycling and walking infrastructure.

The provision of dedicated cycling and walking infrastructure supports the Climate Action Plan 2021 – Annex of Actions Action 231 (Continue the improvement and expansion of the Active Travel and Greenway Network), Action 233 (Construct an additional 1,000km of cycling and walking infrastructure) by the provision of cycleway and Action 234 (Encourage an increased level of modal shift towards Active Travel (walking and cycling) and away from private car use). In addition, the scheme will also facilitate support towards the following Climate Actions:

- Action 276 (Enable greater EV infrastructure roll-out for passenger cars and vans);
- Action 245 (Implement an enhanced rural transport system through delivery of Connecting Ireland Rural Mobility Plan);
- Action 260 (Increase provision of park and ride/share at transport interchanges).

With the reduction of through traffic, the project will allow for major environmental improvements in noise, air and water quality for Virginia Town and Lough Ramor, the proposed Natural Heritage Area. The proposed project will allow the town to be reclaimed for the local residents and will improve their quality of life. The proposed Scheme seeks to support the integration and growth of bus transportation in the Study Area with the integration of transport park and share hubs (mobility hubs) into the scheme that will include safe bus stops and EV charging facilities, with the aim of encouraging a modal shift to sustainable transport modes.

A Waste Action Plan for a Circular Economy: Ireland's National Waste Policy 2020-2025

The Scheme will assess best options for resource waste management and circular economy to enhance whole-life-cycle value of the project. Detailed measures will be prepared in further phases of the Scheme to minimise waste to be transported off-site and ensure resource waste management. Improvements in C&D waste management practices can offer many opportunities in terms of reduced environmental and financial costs to the industry. A Resource and Waste Management Plan will be prepared in the next stages of the Scheme to identify activities that will generate waste and to outline how the waste will be dealt with.

National Biodiversity Action Plan 2017-2021

Biodiversity and ecology are key assessment criteria during all phases of the Scheme appraisal and design. This includes assessment of impacts on Natura 2000 Sites, NPWS designated Sites and Key Ecological Receptors across the Study Area. Ecological surveys are conducted through different phases to collect baseline information for detailed assessment. In the next phases as the detailed design develops, the possibility of Biodiversity Net Gain measures will also be assessed. Overall, the Scheme will ensure that any impacts on ecological sites are avoided as much as possible and mitigation measures are developed for any residual impacts.

Road Safety Authority (RSA), Road Safety Strategy, 2021-2030

It is considered that the N3 Virginia Bypass scheme will align with and support the Road Safety Strategy through the provision of a high-quality multi-modal transport solution which implements forgiving roadsides and includes off-road cycle and pedestrian facilities that provide a significantly improved level of segregation within the proposed development.

National Sustainable Mobility Policy

The focus of the National Sustainable Mobility Policy, is to get people out of private cars and to use public transport, bicycles or walk by focussing on making active travel or public transport the most attractive option for travel. The N3 Virginia Bypass scheme will remove a significant volume of vehicular traffic, including HGVs, from Virginia Town and its surrounds. This will result in a much safer environment for pedestrians and cyclists and will enable opportunities for Cavan County Council to provide much improved facilities for vulnerable road users. The inclusion of active travel facilities along the proposed bypass alignment will also encourage safe, integrated, sustainable mobility and help decarbonise the environment within Virginia Town and its environs.

10.3.3 Regional Policy

Regional Spatial and Economic Strategy - Northern and Western Region

The delivery of the N3 Virginia Bypass scheme will align with Regional Policy Objective (RPO) 6.7. Section 3.9 of the RSES identifies Virginia as performing important regional functions for employment, housing and services. Virginia is referenced as one of the main economic drivers for wider highly populated catchments, where commuting out of the counties is an issue that needs to be addressed by providing employment and support services. Virginia is strongly positioned to attract businesses, that need access to the Belfast/Dublin corridor, available talent, quality of life and housing. Completion of the N3 Virginia Bypass will improve the attractive for investment in the town and so aligns with this objective.

10.3.4 Local Policy

Cavan County Council Development Plan 2014 – 2020

The N3 Virginia Bypass scheme will contribute directly to objectives PIO 1 to PIO 4, PIO 6, PIO 7, PIO 10 and PIO 22 of the Cavan County Development Plan 2014 – 2020.

Draft Cavan County Development Plan 2022 - 2028

The N3 Virginia Bypass scheme will contribute directly to objectives VB 01 and VB 02, NR 01 to NR 08, RLR 08, ACT 01, WC 01, WC 02 and WC 04, PT 01, PT 02 and PT05, VI 02 to VI 04, VE 01 and VE 03, VSC 07, VRP 06 and VH 05 of the draft Cavan County Development Plan 2022 – 2028.

Meath County Development Plan 2021 - 2027

The N3 Virginia Bypass scheme will align with Sections 5.3 and 5.8 and contribute directly to objective MOV OBJ 45 of the Meath County Development Plan 2021-2027.

10.4 Alignment of Preferred Option with Project Objectives

Table 10-3 outlines how the Preferred Option performs against the project objectives.

Table 10-3 Preferred Option Vs Project Objectives

Criteria	Scheme Objective	Preferred Option
Economy	To be consistent with the National Planning Framework objective of enhancing regional accessibility and enhance connectivity between the 4 cities and the Northern and Western region.	The Scheme will improve journey time reliability and connectivity to Dublin, Cavan and beyond. Active travel corridors will improve connectivity to Virginia and Maghera. In AM, southbound journey time saving of ≈10 minutes and northbound ≈6 minutes. In interpeak (both northbound & southbound) journey time savings of ≈6 minutes In PM, southbound journey time saving of ≈7 minutes and northbound ≈13 minutes.
	To promote and grow the Northern and Western regional economy by creating better transport linkage for people, goods and services, including road based public transport, between Dublin, Cavan and onward to the Northern and Western region.	The Scheme will improve journey time reliability and connectivity to Dublin, Cavan and the Northern and Western region. Proposed active travel corridors will improve connectivity to Virginia and Maghera. Proposed transport park and share hubs (mobility hubs) will improve public transport linkages.
	Improve attractiveness for inward investment and employment in the Virginia, Cavan and the North West Region through improved transport network efficiency and connectivity, including Public Transport and Active Travel connectivity.	The existing N3 through Virginia is estimated to carry over 14,060 AADT (15% HGV) by the year 2043. If the Scheme is approved and constructed, the volume of traffic through Virginia is estimated to reduce by ≈82% to ≈2,500 AADT with only delivery HGVs accessing Virginia. The reduction in traffic through the town, including high volumes of HGVs will provide opportunity to enhance the public realm. Proposed junctions close to Virginia will allow easy access to all areas of Virginia and environs. Proposed active travel corridors will improve connectivity to Virginia and Maghera. Proposed transport park and share hubs (mobility hubs) will improve public transport connectivity.
	Provide a scheme at an investment cost that offers good value for money and reduce the cost of travel	The Preferred Option represents value for money with a positive Benefit to Cost Ratio. The Preferred Option will result in journey time savings of up to 13 minutes during average peak periods, and greater for the more congested times of the week or year (i.e. Fridays). This time saving will greatly reduce the cost of travel.
Safety	To improve road safety by reducing the rate and severity of collisions on the road network and to support the RSA Road Safety Strategy to reduce road deaths and serious injuries by 50% by 2030.	The Scheme has a maximum predicted AADT of 14,060 in the design year 2043, with 15% of this HGV traffic. The Scheme, if approved, will remove strategic traffic including HGVs from the town centre and reduce potential interface with other road users.

Criteria	Scheme Objective	Preferred Option
		An adjacent cycle and pedestrian facility is proposed for the full mainline and link road length. The CoBALT analysis of the Preferred Option estimates a reduction of 463 collisions over a 30 year collision assessment period, including 21 fatal, 72 serious and 370 minor collisions. The Scheme will include strategic junctions only. Direct accesses onto the bypass will be prohibited unless no other feasible alternative access can be provided. The envisaged cross section for the scheme is a Type 2 Dual Carriageway. Therefore the scheme will have safe overtaking opportunities.
	To improve safety for vulnerable road users.	The Scheme has a maximum predicted AADT of 14,060 in the design year 2043, with 15% of this HGV traffic. Proposed active travel corridors will give segregated infrastructure for VRUs. The reduction in HGVs through the town will provide additional space within the existing road cross section to maximise the space available for the provision of VRU facilities.
Environment	To improve the environment in Virginia Town through the reduction of through / strategic traffic	The Preferred Option is mid-placed in terms of kgCO2e for construction out of all offline options assessed. Further mitigation measures will be investigated in Phase 3. Reduction in traffic in Virginia Town centre will reduce emissions. The comprehensive active travel network will encourage walking and cycling, reducing emissions further.
	To support sustainable development principles and measures to minimise effects on the environment including potential climate change effects.	The Preferred Option has one of the lowest volumes of unacceptable material to be disposed off-site and can reuse / recycle the remainder of unacceptable materials in bunds or other non-structural road earthworks, thus minimising the volume of material to be transported along public roads to suitable licenced off-site facilities. Further mitigation measures will be investigated in Phase 3.
	To protect and enhance biodiversity including both legally protected areas and other areas.	The Preferred Option does not directly impact on Natura 2000 sites.
	To reduce pollutants and heavy metals from road surface water drainage from entering watercourses, Lough Ramor pNHA and into the River Boyne and River Blackwater Special Area of Conservation (SAC) and Special Protected Area (SPA), supporting the Water Framework Directive objective for Lough Ramor to restore Good Quality status.	The Scheme, if approved, will provide a comprehensive drainage network and appropriate outfall treatment at all outfall locations to minimise potential impacts on the Lough Ramor pNHA and River Boyne and River Blackwater Special Area of Conservation (SAC) and Special Protected Area (SPA).

Criteria	Scheme Objective	Preferred Option
	To support sustainable and equitable mobility to encourage modal shift to help meet Irelands Climate change goals.	An adjacent cycle and pedestrian facility is proposed for full mainline and link road length. Transport Park and Share Hubs (mobility hubs) proposed at either end of the scheme will facilitate access to Bus Stops and also safe parking to enable carpooling or transfer onto a bike.
Accessibility & Social Inclusion	Improve journey time reliability for all travel modes including bus public transport between Virginia Town, Cavan Town and the North West Region.	The Preferred Option will provide predicted journey time savings in the order of 13 minutes. Reducing congestion in the town will greatly improve journey time reliability. The removal of traffic from the town will also benefit the journey times for bus journeys through the town.
	To improve accessibility for all, in particular vulnerable groups and those in deprived areas, to key facilities such as: – employment, including access to remote working hubs, – education, – health care, – and other essential services, within Virginia Town, Cavan Town, the North West Region and Dublin.	The Preferred Option will eliminate traffic congestion through Virginia and will allow more efficient journeys to hospitals and higher education in Cavan, Navan and Dublin. The reduction of traffic volumes through the town will improve journey times to other essential services located in the town centre.
	Improve quality of life in towns and communities by: ▪ removing strategic and commercial traffic from Virginia Town; and ▪ reducing rat running of traffic on the unsuitable local road network.	The reduction of traffic volumes, including significant HGV traffic, through the town will improve the local environment and make the town a more pleasant place to visit. The elimination of congestion through Virginia will encourage travel on the more appropriate safer route of the Preferred Option and eliminate rat running of traffic on unsuitable local roads.
Integration	To facilitate active travel and road connectivity with public transport interchanges, e.g. bus stops and transport park and share hubs (mobility hubs).	The Preferred Option will include Transport Park and Share Hubs (mobility hubs), that will provide safe parking facilities and safe and accessible bus stops and facilitate more carpooling for longer onward journeys, with EV charging facilities and with safe HGV rest parking areas. The number and locations for this hub will be determined during Phase 3.
	To support sustainable development through the provision of appropriate access and adherence to the principles of compact urban growth	The Preferred Option will include Active Travel measures with direct links to existing footways into Virginia and Maghera, and the proximity of the Scheme to Virginia Town will encourage compact growth. The inclusion of the Transport Park and Share Hubs (mobility hubs) will further facilitate the transition to sustainable mobility.

Criteria	Scheme Objective	Preferred Option
	To improve transport links between Dublin, including Dublin Port and Dublin Airport, and Cavan, Border and the North-West Region.	The Scheme will result in journey time savings in the order of 13 minutes during average peak periods, and greater for the more congested times of the week or year (i.e. Fridays). The removal of traffic from the town will also benefit the journey times for bus journeys through the town.
	Improve connectivity for movement around the town and between local communities, including Maghera, for all transport modes, including pedestrians and cyclists.	A dedicated Active Travel network ties in to the existing facilities at strategic locations to enhance cyclist and pedestrian opportunities. The significant reduction of traffic, including removal of all but delivery HGVs from within Virginia will greatly enhance safety and security of vulnerable road users and therefore encourages / facilitates a better uptake of Active Travel within the town.
Physical Activity	Reduce traffic through Virginia Town to enable improvement of the public realm environment and to facilitate improvements for safe walking and cycling and provide a healthier environment conducive to active travel.	The Scheme has a maximum predicted AADT of 14,060 in the design year 2043, with 15% of this HGV traffic. Proposed active travel corridors will provide segregated infrastructure for VRUs. The significant reduction of traffic, including removal of all but delivery HGVs from within Virginia will greatly enhance safety and security of vulnerable road users and therefore encourages / facilitates a better uptake of Active Travel within the town.
	To provide improved connectivity for Vulnerable Road Users (VRUs) to key destinations eg Schools, workplaces, Virginia Town, Virginia Primary Care Centre, tourist facilities, sports complexes and Lough Ramor amenity, village centres).	A cycle and pedestrian facility segregated from mainline traffic will be provided along the full mainline and link roads length. Direct links to existing footways into Virginia and Maghera will be provided, with direct footway links to Carrigabruise National School.

10.5 Road Safety Audit (Stage F Part 2)

Following completion of the Road Safety Audit (RSA) Stage F Part 1 on the Stage 2 Route Corridor Options (see Section 9.3.4 of this Report), an RSA Stage F Part 2 was undertaken on the Emerging Preferred Option Corridor (Option Cv2).

The Stage F Road Safety Audit (Part 2) was carried out in accordance with TII's GE-STY-01024 Road Safety Audit Standard (December 2017). The Audit was undertaken by TII approved Road Safety Audit Team who are independent from the Design Team.

As per Clause 3.9.9 of GE-STY-01027, the Stage F Audit Report is in two separate parts, the first part (i.e. Stage F, Part 1) assesses and ranks all of the Stage 2 Route Corridor Options in terms of road safety impact, whilst the second part (i.e. Stage F, Part 2) is focussed only on the option selected as the Emerging/Preferred Route Corridor Option. The Part 2 Audit identifies potential road safety issues with respect to the option, and provides recommendations. Thereafter, these recommendations are reviewed and responded to by the Design Team, where the Auditor then determines approval of Audit.

A copy of the Stage F (Part 2) Audit is provided in Part C of Volume 6.

In accordance with TII Standards, the RSA Process continues throughout the lifecycle of the project, with subsequent audits being undertaken at the completion of discrete stages of the scheme development. This will include a RSA Stage 1 at the completion of the preliminary design as part of the subsequent TII PMG Phase 3 (Design and Environmental Evaluation).

10.6 Preferred Option with Alternative Demand Sensitivity Test

Covid-19 has accelerated change in when people travel, how people travel and whether they will travel at all. With more people working from home there were less people travelling to employment centres, however, more people were travelling to and within local centres. As travel restrictions are lifted in 2021 and 2022, employees who were able to work from home during the pandemic will start returning to offices, some on a blended basis of part-time home working and part-time office based. This changed working pattern has the potential to reduce travel demand on the local and national road network.

To assess this potential reduction in demand, TII have developed an “Alternative Future Demand Scenario” which can be used in the appraisal process. Under normal circumstances, the Preferred Option (Option Cv2) would be modelled using these Alternative Demand Scenario and the resulting model outputs used to carry out a sensitivity cost benefit analysis. This sensitivity test would provide a better understanding of how changing commuting patterns, and increased working from home, might impact the economic viability of the project. But, as mentioned in section 3.3, the traffic counts which the base year models are calibrated to were carried out in September / October 2020. The majority of the country was under “Level 3” travel restrictions at this time which involved limited numbers for social gatherings and advising people to not travel outside their county, amongst other restrictions. From an analysis of TII’s Traffic Monitoring Units (TMU) using data for the same period which the counts were undertaken in 2020 and the equivalent period in 2019, it was found that the 2020 counts were approx. 12% lower than those in 2019. As a result of this the forecast AADTs output from the models (which have been calibrated to 2020 data) are likely to be approximately 12% lower than if the model had been developed using “typical” or Pre-Covid Traffic data. Additionally, it follows that the calculated benefits of each option are also likely to be underestimated. Given this information, it is not deemed necessary to test a further reduction in demand using the Alternative Future Demand Scenario.

10.7 Recommendation

Following completion of the Stage 3 Process, the PABS was undertaken, and feedback was received and considered as part of the Non-Statutory Public Consultation on the Emerging Preferred Option Corridor. This completes the TII PMG Phase 2 three stage Option Selection Process for the proposed N3 Virginia Bypass scheme.

The Option Selection assessment process concluded that the Emerging Preferred Option, which was a **modified version of Option Cv2**, together with active travel, public transport and demand management components, is the optimum transport solution. It is recommended that these measures form the Preferred Transport Solution for the N3 Virginia Bypass scheme. The Preferred Transport Solution meets the Project Specific Need, as outlined in Section 2 of this Report, and the Scheme Objectives, as outlined in Section 1.5 of this Report.

The Preferred Transport Solution is an integrated solution that will encourage people to make lower carbon travel choices and will remove a significant volume of traffic from Virginia Town and environs. This will create a safer, vibrant and attractive environment in which people can live, work, play and learn. The components that make up the Preferred Transport Solution are summarised below:

- Active Travel Component – The Scheme will incorporate walking / cycling facilities along the full length of the scheme and link roads and will connect with existing footways in Virginia and Maghera as well as connectivity to other key trip attractors, where feasible. Bike parking and charging facilities for electric bikes will also be incorporated;
- Public Transport Component – The implementation of the road-based component of the Preferred Transport Solution will improve journey time reliability for Buses and can facilitate the improvement for Bus Services by removing congestion. Transport Park & Share Hubs (Mobility Hubs) will be provided at either end of the scheme and these hubs will provide safe access to bus services, safe parking, charging facilities for electric vehicles and electric bikes, and will be accessible via road and the active travel facilities;
- Demand Management Component – Demand Management measures within Virginia Town shall also be implemented as part of the scheme, with measures that will include the implementation of a 30km/h speed limit within Virginia Town and the removal of strategic HGV traffic by adopting a HGV / Axle ban within the town (except for deliveries within the town);
- Road Infrastructure Component – The road based corridor, following the **modified Option Cv2** is c.14.5km in length and commences at the end of the N3 Dual Carriageway at Derver in Co. Meath and continues in a northerly direction into Co. Cavan, bypassing to the east side of Whitegate Cross, east of Maghera and east of Virginia Town before continuing north of Virginia Town, following along / adjacent to the existing N3 and terminating to the north side of Lisgrea Cross. The road-based corridor also includes a link to the existing N3 on the south side of Virginia, named the Burrencarragh Link Road and a link to the north side of Virginia to the R194 regional road, named the R194 Ballyjamesduff Link Road.

In conclusion, this Option Selection Report recommends the Preferred Transport Solution (Preferred Option) be carried forward to form the basis of Phase 3 (Design and Environmental Evaluation).