Roads Service

A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road)

Stage 2 Scheme Assessment Report

ISSUE 1

Roads Service

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Ove Arup & Partners Ltd
The Linenhall, 8th Floor, 32-38 Linenhall Street, Belfast, BT2 8BG
Tel +44 (0)28 9089 0900 Fax +44 (0)28 9089 0901
www.arup.com

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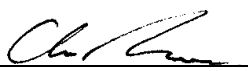
		Signature			
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Background and Basis of Study

The Northern Ireland Regional Development Strategy (RDS) identifies Larne as one of the five major inter-regional gateways in Northern Ireland, and promotes the aim to *'continue to develop the Port of Larne which is the second largest Northern Ireland port, specialising in roll-on/roll off traffic and offering the shortest sea crossings to Scotland.'*

The RDS is supported by a 10-year Regional Transport Strategy 2002-2012 (RTS) which is being progressed through Transport Plans including the Belfast Metropolitan Transport Plan (BMTP). BMTP outlines *'…that options to complete the dualling of the A8 are retained.'*

The Investment Strategy for Northern Ireland 2008-2018 (ISNI) and Investment Delivery Plan for Roads (IDP), includes a number of key goals and includes *'opening the A5 and remaining sections of the A8 dualling schemes during the life of the strategy'* as one of the key milestones in working toward those goals. The IDP has therefore defined the scheme to dual the remaining 14km section of the A8, between Coleman's Corner and B100 (Ballyrickard Road), to be within its Preparation Pool and estimates delivery of scheme between 2013/14 to 2017/18.

A Stage 1 Assessment for this scheme was completed for the route in November 2008 and recommended that two of the eight corridors considered should be taken forward for more detailed assessment at Stage 2.

This Stage 2 assessment provides a 'route' appraisal for the scheme and identifies the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with different routes. The study has been undertaken in accordance with the *Design Manual for Roads and Bridges* (DMRB), *TD 37/93 – Scheme Assessment Reporting,* and the *New Approach to Appraisal* (NATA), which is the recommended basis for the appraisal of road schemes throughout the UK. Throughout the NATA process, the Government's 5 over-arching objectives of environment, safety, economy, accessibility and integration.

The assessment of each of these objectives has been undertaken using the guidance set out in the Department for Transport's (DFT) web-based *Transport Analysis Guidance* (WebTAG).

Baseline Conditions

The study area comprises the 14km section of the A8 between the Coleman's Corner roundabout (junction with the B95, Hillhead Road) and the B100 (Ballyrickard Road). The existing road is a single carriageway with 17 side road junctions within the study area.

The existing road is mainly derestricted (with a 60mph speed limit), but a short section through the village of Ballynure is subject to a 40mph speed limit. The standard of geometry of the existing road is reasonably high but there are a few locations where improvements would be required to accommodate a design speed of 120kph appropriate to a dual carriageway.

There are limited engineering constraints within the study area. These include 11 watercourse structures/ bridges, four of which cross main watercourses and the remainder are smaller culvert-type structures. All structures are in a reasonable condition. There is a range of utility services mainly running along the road, including water and telecommunications. However, there are also a number of high voltage overhead power cables, a gas main and a watermain that cross the existing road.

The ground conditions within the study area generally comprise glacial till, which is thin and discontinuous in places and is often soft. There are also a number of poorly drained areas

along the scheme and drumlins and hills shape the topography alongside the existing A8. Some isolated areas of shallow basalt rock are also present.

The study area is rural in nature, interspersed by farmsteads and isolated dwellings, minor roads and agricultural fields. The main features of the study area are the A8 road itself and the settlements of Bruslee and Ballynure which are situated along the line of the A8. The study area comprises land from two local Government districts: Newtownabbey (south) and Larne (north). Other key environmental features of the study area include:

- a number of commercial premises and outlets;
- several nature conservation sites ;
- four notable rivers and numerous other streams, drains and minor water bodies;
- One Scheduled Historic Monuments, a listed building and known sites of local archaeological interest dispersed throughout the study area; and
- Large areas of best and most versatile agricultural land.

Traffic Assessment

A number of traffic studies and surveys have been undertaken as part of this scheme assessment. The traffic surveys were undertaken in spring 2008, including Road Side Interviews, Automatic Traffic Counts, Manual Classified Counts and Journey time surveys. The data collected during these surveys provided information on the existing traffic conditions on the A8 and its side roads, which was used as the basis for developing a 2008 base year traffic model using SATURN software. The traffic model was developed to produce traffic forecasts for the proposed A8 dualling scheme for the assumed year of opening 2016, and for fifteen years later at the design year, 2031, as well as an interim year of 2023. The traffic forecasts have been used to inform the operational, environmental and economic impacts of the proposed scheme.

Traffic forecasts were produced for a do-minimum scenario (without the scheme) and the do-something scenarios (with the scheme in place). For the purpose of this Stage 2 Scheme Assessment Report, only the central growth traffic forecasts have been considered, as these are the most likely to occur.

A DMRB congestion reference flow (CRF) assessment was used to assess the traffic conditions on the existing road and the proposed dual carriageway. The CRF assessment showed the road to be currently operating at 67% of its theoretical capacity, which would rise to 90% by the design year 2031. Journey time reliability is said to be affected and ‘driver stress’ begins to be experienced when the ratio reaches 75%. Improving the road to dual carriageway standard would increase its capacity such that it would operate at 40% of its capacity in 2031.

Accident statistics have also been analysed for the section of the A8 under assessment for the four year period from 2004 to 2007. In this period, 43 accidents were recorded and although the number of accidents is below the default COBA accident rates, the number of fatal accidents recorded on this section of the A8 is higher than would be expected for a typical single carriageway road. However, because the number of slight accidents is significantly less than would be expected it may suggest some slight accidents are not being reported.

A review of junction strategy recommended rationalising the number of junctions along this section of road to better suit the safety and design requirements of a high speed dual carriageway. This included a roundabout at both ends of the scheme, 4 compact grade separated junctions and a full grade separated junction at the A57 (Templepatrick Road) junction. The remaining side roads would either be retained through left-in left-out junctions, bridged over the A8 or stopped up.

Consultation

Public and stakeholder consultation is a key part of the scheme assessment process, and a thorough and comprehensive consultation strategy was prepared and implemented. Relevant statutory and non-statutory consultees were contacted during both the Stage 1 and Stage 2 assessment process, and their input incorporated into the scheme assessment process.

Early consultation for this scheme assessment was undertaken during Stage 1 in the form of a Public Information Day Exhibition. This exhibition focused on the existing engineering and environmental constraints as well as presenting the scheme assessment process. During and following the public exhibition a number of members of the public and other interested stakeholders provided written feedback on the scheme.

Early in the Stage 2 process, the recommended corridors from the Stage 1 assessment were presented to the key stakeholders and the public through a 2-day Public Exhibition. The exhibition updated the public and key stakeholders on scheme assessment process and focused on the two recommended corridors and four sub-corridors. The information presented at the exhibition was condensed and summarised into an A3 leaflet, with a tear-off feedback sheet. The feedback sheet asked the attendees to provide a preference and rank a series of options.

From the resulting feedback there is no clear public preference for the route options at Bruslee, or for which corridor should be adopted around Ballynure. A number of additional comments were also received and were collated in a series of key issues which have been incorporated into the Stage 2 assessment process. Further to the exhibition, a comprehensive series of on-site one-to-one visits to all potentially directly affected landowners were undertaken.

Overall, there is a majority of public support for the A8 improvement scheme. However, there is no clear preference on whether a bypass should be provided for Bruslee and which option should be adopted around Ballynure.

Stage 2 Routes Considered

The Stage 2 Assessment has developed a range of routes within the recommended corridors based on the key constraints and features identified. This includes the development of junction strategy for the whole scheme (as outlined in Chapter 5), and layouts for each of the all-movement junction locations. For the assessment the scheme has been split into three sections which have enabled an assessment of the different routes within each section. The 'Preferred Route' for the overall scheme would therefore be an amalgamation of the best route for each of the three sections. The three sections considered are:

- Section A, Bruslee Section – Coleman's Corner Roundabout to Calhame Road
- Section B, Ballynure Section – Calhame Road to Junction Lane
- Section C, Northern Section – Junction Lane to B100 (Ballyrickard Road)

Section A

Three route options were developed:

- Route A1 – This option would follow the western edge of the Preferred Corridor and provide an online solution for Section A.
- Route A2 – This option would pass through the middle of the Preferred Corridor and provide an *inner* bypass of Bruslee.
- Route A3 – This option would follow the eastern edge of the Preferred Corridor and provide an *outer* bypass of Bruslee.

Section B

Six route options were developed:

- Route B1 – This option would provide an outer bypass to the west of Ballynure leaving the existing alignment approximately 550m south of the existing A57 (Templepatrick Road) roundabout.
- Route B2 – This option would provide an inner bypass to the west of Ballynure leaving the existing alignment approximately 550m south of the existing A57 (Templepatrick Road) roundabout.
- Route B3 – This option would also provide an inner bypass to the west of Ballynure similar to Route B2. However, Route B3 would stay online for a greater length and leave the existing A8 alignment at the existing A57 (Templepatrick Road) roundabout.
- Route B4 – This option would provide an inner bypass to the east of Ballynure leaving the existing corridor just to north of Legaloy Road.
- Route B5 – This option would provide an outer bypass to the east of Ballynure leaving the existing corridor immediately after the existing Legaloy Road junction.
- Route B6 – This option would also provide an inner bypass to the west of Ballynure, and is a combination of Routes B2 and B3. Route B6 is the first half of Route B2 and the second half of Route B3.

Section C

Only one route option was developed for Section C, although a number of sub-routes were considered and discounted at an early stage:

- Route C1 – This option would follow the existing A8 and would provide an online solution for Section C. The route would weave across the existing A8 to minimise the impact on buildings and residential properties along the existing road.

Stage 2 Assessment

The Stage 2 Scheme Assessment has been undertaken in accordance with the methodologies set out in the DMRB, the *New Approach to Appraisal (*NATA) and DfT's WebTAG guidance, which is the recommended basis for the appraisal of road schemes throughout the UK. WebTAG is an updated version of NATA and is also applicable to multi-modal transport schemes.

Section A

In terms of the mainline geometry, all routes have been designed, both horizontally and vertically, in accordance with DMRB TD 9/93 for a design speed of 120kph. However, the associated side road geometries for all three routes would require some Relaxations and Departures from Standard. The structural requirements for all three routes would be similar, with a single new structure across the Ballylinny Burn. In terms of geotechnical issues, all routes are likely to encounter localised areas of poorly drained material, which may need to be replaced to ensure a suitable foundation for the road. Route A1, however, crosses the site of an old petrol filling station in Bruslee, which is potentially a source of contaminated land.

All routes within Section A performed satisfactory in terms of traffic capacity.

In terms of the **Environmental Objective,** the main environmental aspects which provide some differentiation between the routes are Noise, Landscape, Townscape, Biodiversity, Physical Fitness and Journey Ambience. The noise assessment demonstrated that Route A1 would have the least impact, with Route A3 resulting in the greatest impact. Route A1 performs the best in terms of implications on the local landscape; however, Routes A2 and

A3 have the least impact on Townscape. The impacts on habitats and protected species will be similar for all routes, however Route A1 is assessed to have the least impact because it minimises the amount of greenfield land required. The impact on Physical Fitness and Journey Ambience is best with Routes A2 and A3. Therefore, in terms of the environment, the best performing route is Route A2.

All proposed routes would be expected to perform well in terms of the **safety objective**. However, the safety performance could be affected by the road layout and the risks associated with the construction, maintenance and demolition. Routes A2 and A3 would result in slightly improved safety because they do not require sections of parallel access roads which could lead to dazzle problems depending on mitigations measures, and include less risk during the construction, maintenance and demolition phases. Therefore a marginal safety preference would be for Routes A2 or A3.

The assessment of the **economy objective** identified that the benefits associated with the different routes with Section A would be the same, with the only differential formed by the capital costs for the each route. The differences in the scheme cost are relatively small, but the lower costs for Routes A2 and A3 will result in the best economic performance.

The severance sub-objective is the only aspect of the **accessibility objective** to show a differential between the routes. Routes A2 and A3 are the best performing routes in relation to severance because they remove the A8 from the small settlement of Bruslee, reducing the hindrance to non-motorised users.

There is no significant difference between the three routes in relation to the **Integration objective** and therefore the objective did not influence on the selection of a 'Preferred Route' within Section A.

Appraisal summary tables (ASTs) for the three routes are provided at the end of each route assessment chapter.

The recommended preference for route for Section A is Route A2.

Section B

In terms of the mainline geometry, all routes have been designed, both horizontally and vertically, in accordance with DMRB TD 9/93 for a design speed of 120kph. However, the associated side road geometries for all three routes would require some Relaxations and Departures from Standard. The structural requirements for all six routes would be similar, however the western bypass options (B1, B2, B3 and B6) would require less structures, although one of them will be a large structure across a road and watercourse. In terms of geotechnical issues, all routes are likely to encounter localised areas of poorly drained material. In addition all the routes are likely to encounter basalt bedrock where they are in cutting. However, the main geotechnical difference between the routes is to the west of Ballynure (Routes B1, B2, B3 and B6), where they may intersect the groundwater flowing through the fractured basalt bedrock requiring additional drainage measures.

The traffic assessment of routes within Section B showed that the best performing routes are the western bypass options (Routes B1, B2, B3 and B6) because they remove a greater amount of traffic, including HGVs, from the village of Ballynure. The eastern bypass options (Routes B4 and B5) considerably reduce traffic in the village, but fail to remove the HGVs which continue to take the shortest route, through the village.

In terms of the **Environmental Objective,** the main environmental aspects which provide some differentiation between the routes are Landscape, Heritage, Biodiversity and Water Environment. In terms of the Heritage/Historic Resources, Routes B1, B3 and B6 would have the least impact on known recorded historic resources. Routes B4 and B5 performs the best in terms of implications on the local landscape. The impacts on habitats and protected species will be greatest with Route B3, and in terms of the Water Environment

Routes B2, B4, B5 and B6 would have the least impact. Therefore, in terms of the environment, the best performing routes are Route B2, B4, B5 and B6.

All proposed routes would be expected to perform well in terms of the **safety objective**. However, the safety performance would be affected by the road layout and the risks associated with the construction, maintenance and demolition. Routes B4 and B5 include a connection between the old A8 and the compact grade separated junction link road at Ballybraken Road. The constraint junction layout formed by an eastern bypass of Ballynure represents a safety concern because of queuing vehicles leading to rear-end shunts and sudden braking. Therefore a marginal safety preference would be for Routes B1, B2, B3 and B6.

The assessment of the **economy objective** is summarised in the table below.

Section B Economic Assessment Summary

	Route B1	Route B2	Route B3	Route B4	Route B5	Route B6
Net Present Value (NPV)	**£36.6m**	**£39.6m**	**£38.7m**	**£21.1m**	**£24.5m**	**£40.3m**
Benefit to Cost Ratio (BCR)	**1.45**	**1.50**	**1.48**	**1.28**	**1.33**	**1.51**

Routes B6 is the best performing route in terms of overall economic performance.

The severance sub-objective is the only aspect of the **accessibility objective** to show a differential between the routes. *A*ll routes will reduce the amount of traffic going through Ballynure therefore reducing the hindrance to non-motorised users and severance. Routes B1, B2, B3 and B6 are considered to perform slightly better because they will reduce the amount of through traffic in Ballynure by a greater amount than Routes B4 and B5.

There is no significant difference between the three routes in relation to the **Integration objective** and therefore the objective did not influence on the selection of a 'Preferred Route' within Section B.

Appraisal summary tables (ASTs) for the three routes are provided at the end of each route assessment chapter.

The recommended preference for route for Section B is Route B6.

Section C

Only one route option (Route C1) was developed for Section C, although a number of sub-routes were considered and discounted at an early stage.

Recommendation for the 'Preferred Route'

The recommendation of this Stage 2 assessment for the A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road) is that the 'Preferred Route for the scheme, to be taken forward into the detailed Stage 3 assessment, would be an amalgamation of **Routes A2, B6 and C1.** This is based on the project team's professional judgement on the overall balance of all the information generated and assessed in the Stage 2 assessment. The cost estimate for this combination of routes based on Q1 2009 (January to March) rates is £113,293,031, and the economic assessment showed a NPV of £40.3 million and a BCR of 1.51 for the whole scheme.

1 Introduction

This report is the Stage 2 Scheme Assessment for the A8 Belfast to Larne Dual Carriageway, and is based upon the recommendations set out in the Stage 1 Assessment Report, November 2008.

1.1 Background to the Scheme

The Northern Ireland Regional Development Strategy (RDS): Shaping Our Future guides the development of Northern Ireland to 2025. One of the priorities of the strategy with respect to supporting economic development is *'to promote regional gateways as economic development opportunities.'* The RDS identifies Larne as one of the five major inter-regional gateways in Northern Ireland, and under this priority, the strategy promotes the aim to *'continue to develop the Port of Larne which is the second largest Northern Ireland port, specialising in roll-on/roll off traffic and offering the shortest sea crossings to Scotland.'*

The RDS is supported by a 10-year Regional Transport Strategy 2002-2012 (RTS). The RTS aims to make significant contributions towards achieving the longer-term vision for transport put forward by the RDS, which is *'… to have a modern, sustainable, safe transportation system which benefits society the economy, and the environment and which actively contributes to social inclusion and everyone's quality of life...'.*

The RDS and RTS aim to develop a Regional Strategic Transport Network, based on the Key Transport Corridors. The A8 forms part of the Eastern Seaboard Key Transport Corridor which encompasses road and rail links between the Belfast Metropolitan Area, Dublin and Larne. Delivery of the detailed content of the strategy is being progressed through three Transport Plans; the Regional Strategic Transport Network Transport Plan (RSTN TP), the Belfast Metropolitan Transport Plan (BMTP) and the Sub-Regional Transport Plan (SRTP).

BMTP outlines that *'The A8 is the strategic link between Belfast, via the M2, to the Regional Gateway of Larne. It forms a key element of the RSTN and has been improved with road widening schemes and heavy goods vehicle crawler lanes in recent years. The Plan proposes that options to complete the dualling of the A8 are retained.'*

The Investment Strategy for Northern Ireland 2008-2018 (ISNI) outlines that over the next three years around £6billion of new infrastructure will be delivered which includes £0.6billion over the next three years of investment in roads, and a total of 3.1billion over the whole life of the strategy up to 2018. The ISNI includes a number of key goals and milestones and includes *'opening the A5 and remaining sections of the A8 dualling schemes during the life of the strategy'* as one of the key milestones in working toward those goals.

The Investment Delivery Plan for Roads (IDP), which provides additional details on future infrastructure investments, states that 'Roads Service believe meeting the Regional Development Strategy objectives will require upgrading of all key transport corridors to at least dual carriageway standard'. The IDP also identifies the 'A8 improvements will further enhance the link from the Port of Larne to Belfast and Dublin'. The IDP has therefore defined the scheme to dual the remaining 14km section of the A8, between Coleman's Corner and B100 (Ballyrickard Road), to be within its Preparation Pool and estimates delivery of scheme between 2013/14 to 2017/18.

1.2 The Scheme Assessment Area and Proposals

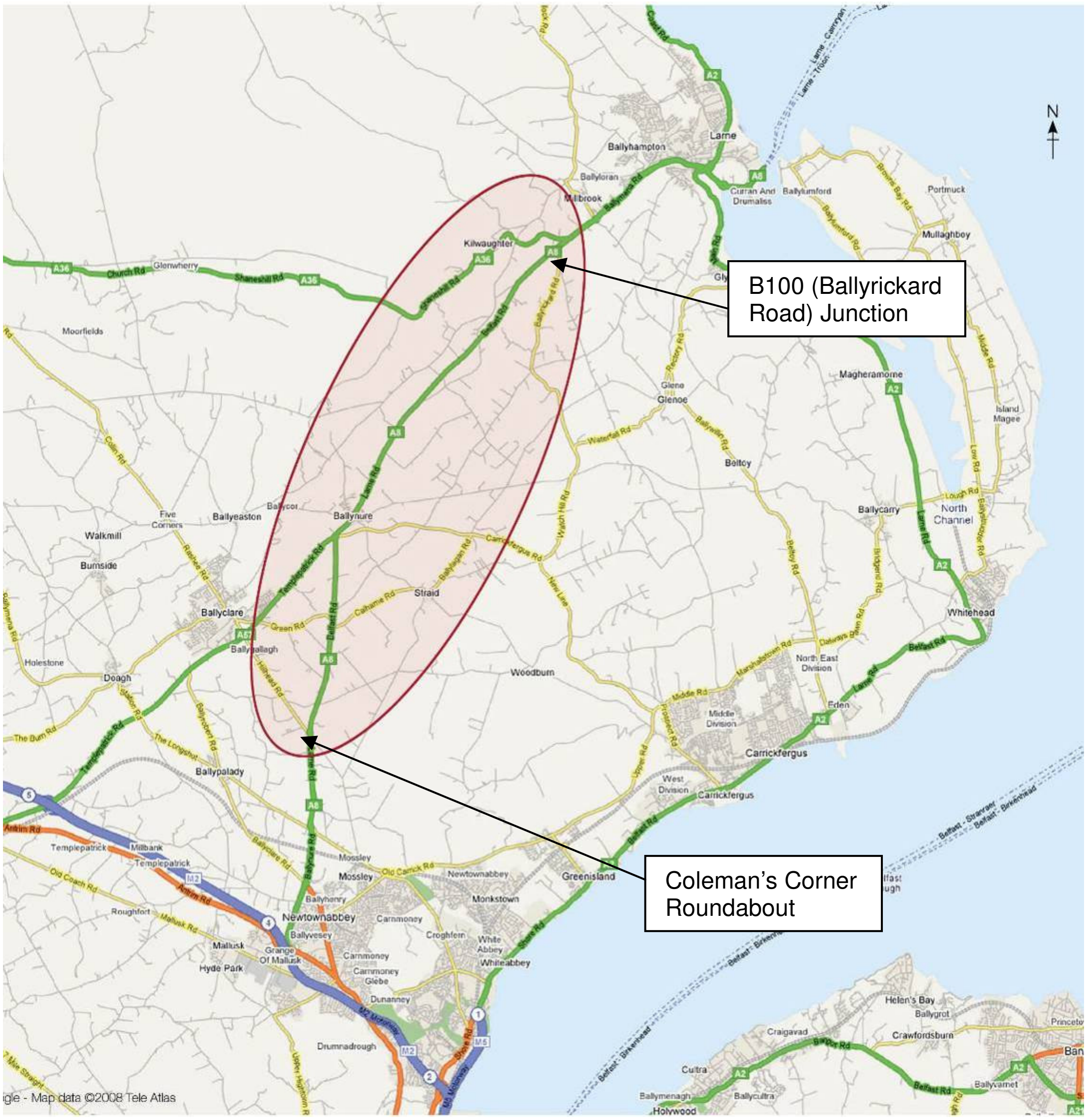
The section of the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is a 14km stretch of single carriageway road. Sections of the road carry traffic volumes of up to 17,000 vehicles per day and the road suffers surges in flow and platooning at times coinciding with ferry arrivals and departures at the Port of Larne. The road forms junctions with a high number of side roads and residential access roads which directly connect to the main carriageway. Although crawler lanes have been recently constructed on either side of

the village of Ballynure, there are a restricted number of overtaking opportunities along the remainder of the scheme.

The proposals for the improvement scheme for the A8 involve upgrading this section of single carriageway road to dual carriageway standard.

A location plan illustrating the existing road can be seen below in Figure 1.1.

Figure 1.1: Location Plan



The key objectives for Roads Service implementing the scheme are to improve this section of the A8 to dual carriageway standard, therefore completing a minimum of dual carriageway standard along the eastern seaboard key transport corridor. This will lead to improvements in journey times and road safety.

- Complete a minimum of dual carriageway standard along the eastern seaboard key transport corridor;
- Reduce journey times with increased journey time reliability; and
- Improve road safety.

1.3 Scheme Assessment Process

The scheme assessment for this road improvement proposal is being carried out in accordance with the requirements of the Department for Transport’s (DFT) web-based

Transport Analysis Guidance (WebTAG) and the Design Manual for Roads and Bridges (DMRB), specifically TD 37/93, Scheme Assessment Reporting and Volume 11 for the environmental assessment. The DMRB is published by Her Majesty's Stationery Office and is applicable in Northern Ireland.

The scheme assessment process typically involves a three stage approach:

- Stage 1 assessment - a largely desk-based exercise making use of published information and a series of initial site visits and surveys, information collection and review, identification and mapping of constraints and liaison with relevant departments and stakeholders. The preliminary assessment is conducted at the "broadly defined route corridor" level. The output of Stage 1 is normally the recommendation of a preferred corridor to be taken forward to Stage 2.
- Stage 2 assessment - this involves a more detailed assessment including surveys to identify the key effects and factors to be taken into account when selecting and comparing alignments. This requires the application of a formal multi-criteria assessment approach based on the WebTAG methodology endorsed by the Department of Transport (i.e. similar to the former GOMMMS process) to assist in the identification and selection of a preferred route alignment. The output of Stage 2 will be the preferred route alignment.
- Stage 3 assessment - this involves the further design development of the preferred route. This stage of assessment requires completion of an environmental impact assessment and the preparation of an environmental statement in accordance with Part 5, Article 67 of The Roads (Northern Ireland) Order 1993, implementing EC Directive 85/337, as amended by Council Directive 97/11 for the preferred corridor. In addition, the production of draft vesting and direction orders will be required.

1.4 Stage 1 Assessment Recommendations

The ***Stage 1 Assessment*** for this scheme was completed in November 2008. It was a 'corridor' assessment and broadly identified the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with a range of broadly defined improvement strategies. Twelve corridors were initially developed which combined both online and off-line solutions to providing a dual carriageway between Coleman's Corner and the Ballyrickard Road. Four of these corridors were discounted at an early stage, based upon a broad assessment, as these were deemed unviable or better corridors were considered to exist which performed broadly the same function.

The final Stage 1 assessment recommended that two of the eight corridors should be taken forward for more detailed assessment at Stage 2. The two recommended corridor options are illustrated on drawing A8-HWY-007 in Appendix B.

1.5 Stage 2 Assessment Study

This report summarises the results of the ***Stage 2 Assessment*** for the A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road). The study provides a detailed and rigorous assessment of a range of 'route options' that have been developed from the recommended Stage 1 corridors.

The study has been undertaken in accordance with the *DMRB TD 37/93 – Scheme Assessment Reporting,* and the *New Approach to Appraisal* (NATA), which is the recommended basis for the appraisal of road schemes throughout the UK. Throughout the NATA process, the Government's 5 objectives are central:

- Environment,
- Safety,

- Economy,
- Accessibility, and
- Integration.

The appraisal of each of these objectives has been undertaken using the guidance set out WebTAG, which is essentially guidance as to how each objective should be appraised. It sets the context for the appraisal process and provides a structured appraisal framework to enable comparison between options, culminating in the recommendation of a 'Preferred Route'.

1.6 Structure of the Report

This Stage 2 Assessment Report comprises 13 chapters, which are summarised as follows:

- Chapter 1 is the *Introduction*;
- Chapter 2, *Existing Engineering Conditions*, considers the existing route conditions in terms of the built environment;
- Chapter 3, *Existing Environmental Conditions*, considers the existing route in terms of the natural environment;
- Chapter 4, *Planning Policy and Legislation*, provides an assessment of the legislative, environmental, and planning policy context, within which the proposed A8 Dualling scheme sits;
- Chapter 5, *Traffic Assessment*, discusses the existing traffic conditions for the A8 and assesses the impact of traffic growth and the need for route improvement;
- Chapter 6, *Consultation*. This chapter summarises the consultation undertaken with statutory consultees, key stakeholders and the public;
- Chapter 7, *Stage 2 Route Options*, presents the route options that have been developed as part of this Stage 2 assessment;
- Chapter 8, *Assessment and Appraisal Methodologies*, presents the assessment and appraisal methodologies adopted for route assessment;
- Chapters 9 to 11, *Route Option Assessments.* These three chapters provide the results of the Stage 2 Assessment of the routes within the three sections of the scheme;
- Chapter 12, *Route Option Comparison and Discussion* of the *'Preferred Route'*. provides a like-for-like comparison between the routes and recommends a 'Preferred Route' to be taken forward into the Stage 3 assessment; and
- Chapter 13, *Summary and Conclusions*, provides a summary of the Stage 2 scheme assessment study.

2 Existing Engineering Conditions

This chapter presents a summary of the key aspects of the engineering assessment of the existing route.

A thorough assessment of the existing engineering conditions was undertaken as part of the Stage 1 assessment, and the details of this assessment are provided in Appendix A. In addition, Drawing numbers A8-HWY-001 and 002 (Appendix A) are 1:10,000 scale plans of the study area and illustrates the existing road and surrounding area. The plans have been annotated to highlight the key engineering constraints and features along the corridor.

The have been no changes to the engineering conditions for the existing route since the publication of the Stage 1 Scheme Assessment Report.

2.1 Route Description

The A8 forms part of the main road link between Belfast and Larne. The section of the A8 under assessment is the 14km section between the Coleman's Corner roundabout (junction with the B95, Hillhead Road) and the junction with the B100 (Ballyrickard Road) on the outskirts of Larne.

The existing route is rural in nature and passes through an agricultural setting. This is prevalent to both sides of the road. This section of the A8 bisects the small settlement of Bruslee, which is situated at the southern end of the route, and also the village of Ballynure, which is situated towards the middle of the study area.

A more detailed description of the route is provided in Appendix A.

2.2 Highway Geometry

In general the A8 has a relatively straight horizontal alignment incorporating large radii above the desirable minimum radius for the design speeds. There is, however, one area where the road is subject to a reasonably tight horizontal radius. This is between the A57 (Templepatrick Road) roundabout and Ballynure, where the road undertakes a tight right-hand bend of approximately 330m radius. In this location the speed limit is 40mph, so the radius is one-step below desirable minimum for the corresponding 70kph design speed.

The majority of the route is subject to the national speed limit of 60mph (100kph), and an assessment of the existing vertical curvature shows that at five locations the vertical alignment is one-step below desirable minimum. However, in the vicinity of the Moss Road junction the existing vertical geometry is two-steps below desirable minimum.

The A8 has 17 separate side road junctions along its length. Of these, three are considered to be key junctions as these cater for significantly higher levels of traffic than the others. The three key junctions are listed below.

- Coleman's Corner Roundabout - B95 (Hillhead Road) and Camtall Road Roundabout;
- A57 Templepatrick Road and B58 Carrickfergus Road Roundabout; and
- B100 (Ballyrickard Road) Junction.

The other junctions are typically at-grade, priority junctions with some comprising localised carriageway widening of the A8 and associated road markings to accommodate right right-turn lanes. Five of these priority junctions, however, are simple junctions without any mainline right-turn reserves. There are also numerous private entrances on both sides of the carriageway, including private vehicular accesses and direct field entrances.

2.3 Structures

A desk based assessment of the existing structures was undertaken using Principal/General Inspection Reports, Assessment Reports and as-built drawings as is summarised in Appendix A, with the location of each structure identified on drawing number A8-HWY-001 and 002 (Appendix A). The key structures along the scheme are:

- **Ballylinny Burn - Bridge No. 20050.** This bridge is located approximately 0.5km north of the Coleman's Corner roundabout (the southern end of the scheme).The bridge comprises a single span slab structure that carries the A8 road over the Ballylinny Burn.
- **Stewartstown Bridge / Bridge No. A8/10 (Structure No. 10523).** Stewartstown Bridge is approximately 50 years old and is located approximately 500m southwest of the A8 junction with Park Road. The bridge is a single span structure that carries the A8 over the Larne River.
- **Bogtown Bridge / Bridge No. A8/9 (Structure No. 10522).** Bogtown Bridge is located immediately to the south of the A8 junction with Park Road. The bridge is approximately 50 years old and is very similar to Stewartstown Bridge in that it carries the A8 over the Larne River.
- **Lowtown Bridge / Bridge No. A8/8 (Structure No. 10521). Bridge No. A8/8 (Structure No. 10521).** Lowtown Bridge is located approximately 500m from the northern end of the scheme and the B100 (Ballyrickard Road) junction. The reinforced concrete bridge is a single span structure that carries the A8 over the Glen Burn, a tributary to the Larne River.

2.4 Highway Drainage

The basis of the existing road drainage system was established through limited as-built records and visual inspections; it is generally a kerb and gully drainage system. However, no manholes were located and therefore it is assumed that gullies either drain into soakaways or out through the embankment slopes.

The A8 passes over 15 watercourses, with the main watercourses of Ballynure Water and Larne River crossed via structures. The remainder of the watercourses are crossed by a variety of culverts and structures.

2.5 Utility Services

The existing utility services within the study area were established via a search of the internet-based Mosaic database which contains digital information on apparatus for several utility companies. This was supplemented by information supplied directly from the identified utility service providers. The key utilities within the study area, and shown on Drawing A8-HWY-006 in Appendix A, are:

- **Northern Ireland Electricity** has a large amount of apparatus and plant in the study area. The main aspects of the equipment are two 275KV and two 110KV overhead cable runs that cross the route to the north of Ballynure. In addition there is a single 33KV overhead cable run that crosses the A8 200m north of Rushvale Road.
- **Northern Ireland Water** has a 15" watermain that crosses the scheme 750m south of the Ballybraken Road Junction. There are also a number of other watermains and sewers present throughout the study area along the A8 and other local roads.
- **British Telecom (BT)** has a major cable route running along the eastern verge of the A8. The cable route is understood to be optical fibre cables and they run the

length of the scheme from the Coleman's Corner junction to the Ballyrickard Road junction.

- **Bord Gais Eireann** has a 450mm diameter gas main which crosses the scheme 150m south of the Ballybraken Road junction.

2.6 Traffic Regulations Orders (TROs)

The A8 within the study area is generally derestricted and therefore, for the majority of its length, is subject to the national speed limit of 60mph. However, a 40mph speed limit applies through Ballynure between a point some 50m south of the A57 (Templepatrick Road) junction, to a point approximately 260m north of the Lismenary Road Junction.

The whole route within the study area is subject to a 24 hour clearway prohibiting stopping on the main carriageway. There is also a short section of waiting restrictions before the Main Street junction in Ballynure where double yellow lines are present.

2.7 Carriageway Lighting

There are two short sections of road lighting and they are both limited to the two settlements on the road. The first section is approximately 670m in length and encompasses the small settlement of Bruslee at the southern end of the scheme. The second section approximately coincides with the 40mph speed restriction through the village of Ballynure.

2.8 Pavement Condition

The existing A8 carriageway consists of a flexible bitumen pavement with kerbs along either side. Deflectograph and S.C.R.I.M (Sideway-force Coefficient Routine Investigation Machine) data was provided for the assessment of pavement for the existing A8. The information suggests the existing pavement construction is generally in a good condition.

2.9 Geology and Soils

The existing geology and soils are discussed in the Materials section of the environmental assessment, see Section 3.5.

3 Existing Environmental Conditions

Establishing the existing environmental conditions for the length of the scheme is the key to defining the baseline by which any potential environmental impacts can be assessed.

As part of the Stage 2 assessment process, a Stage 2 environmental assessment has been carried out and the details and findings are contained in a separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report'*. This chapter presents a summary of the environmental baseline conditions that are detailed in full in that report.

3.1 Air Quality

Within the study area, existing pollutant concentrations are generally low, which reflects the countryside nature of the locality. There are several licensed industrial processes in Larne and Newtownabbey, however these are located several kilometres from the scheme and are not considered to significantly affect ambient air quality in the vicinity of the scheme. The dominant source of air pollutants in the vicinity of the development is and will continue to be vehicle emissions.

Local air quality monitoring has previously been conducted at one location within the vicinity of the proposed route corridor. Passive NO_2 diffusion tubes were deployed by NBC on Main Street, Ballynure; however, the site ceased operation at the end of 2006. The site was located approximately 20m from the A8 and the results of the monitoring are presented in Table 3.1.

Table 3.1: Local Recorded NO_2 Diffusion Tube Concentrations

Monitoring Site / ID	Type	Pollutants Measured	2006 Annual Mean (µg/m^3)
Main Street / 35	Roadside	NO_2	15

The UK objectives and EU Limit Values for NO_2 pollution concentrations are 40µg/m^3. It can be seen, therefore, that the measured NO_2 concentrations along the A8 are well below these levels.

3.2 Cultural Heritage

There are a number of archaeological sites and monuments, historic buildings and industrial heritage sites within the scheme assessment area. There are 59 recorded archaeological sites and monuments within the 500m wide study corridor, including the Lowtown Rath and Souterrain Scheduled Historic Monument which is located close to the existing A8 at the northern end of the scheme. There is also one historic building, Christchurch, located on Church Road in Ballynure, and 27 recorded Industrial Heritage sites and their associated features.

3.3 Landscape

The Northern Ireland Landscape Character Assessment (NILCA) 2000 divides the province into a series of discrete geographical units or Landscape Character Areas (LCA's). There are a number of LCAs in the vicinity of the existing A8 corridor as listed below:

- Tardee and Six Mile Water Slopes Landscape;
- Three and Six Mile Water Valley Landscape;
- Larne Ridgeland Landscape;
- Carrickfergus Upland Pastures; and

- Larne Basalt Moorland.

The Antrim Coast and Glens Area of Outstanding Natural Beauty (AONB) is located to the northwest of the existing A8, extending into the Larne Ridgeland Landscape LCA. There are a number of Local Landscape Policy Areas at the southern end of the scheme and within Ballynure, and a hedge line with a Tree Perseveration Order is located close to the east of Bruslee.

The undulating topography and the arrangement of field boundaries limit direct views from the north towards the existing A8 corridor; however views are more apparent where the road passes on embankment. At Ballynure there are residential areas located immediately adjacent to the existing A8. Properties within these areas have direct views of passing vehicles and lighting columns although, with increasing distance from the road corridor, views become more obscured by intervening vegetation and changes in topography.

3.4 Nature Conservation

There are no European or statutory designated nature conservation sites within or close to the study area. However, there are a number of sites which are of local nature conservation significance within 2km of the either side of the existing A8. The only one of these sites close to the existing A8 is the Clements Woodland site (managed by the Woodland Trust) which consist of wetland fields and woodland.

Other undesignated potential areas of nature conservation value within the general vicinity of the existing A8 include river corridors and associated vegetation including the Six Mile Water and the Inver River, and marshy grassland and habitats which could support protected species.

3.5 Materials

An investigation of the geology and soils was undertaken and the results published in the report, *GN 165: A8 Dualling Belfast to Larne - Preliminary Sources Study Report*, May 2008. In addition, Preliminary Ground Investigations were undertaken in October 2008 and a further report produced summarising the results, *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road) - Preliminary Geotechnical Report*, February 2008. A summary of the main geotechnical features are shown on drawing numbers A8-GEO-001 and 002, which are provided in Appendix A.

The solid geology beneath the study area comprises the Antrim Lava Group and includes three Formations: the Lower Basalt Formation, the Inter basaltic Bed and the Upper Basaltic Formation. Due to jointing, porosity and weathering, the Antrim Lava Group contains significant amounts of groundwater in places. This groundwater discharges to the surface in numerous springs and risings within the scheme study area.

The Antrim Lava Group is overlain by a discontinuous and generally very thin cover of superficial deposits, typically between 2.0 to 3.0m thick. Two types of material are present: glacial deposits and alluvial deposits.

Except within the valley bottoms, there are generally only small amounts of groundwater within the superficial deposits. During the digging of the preliminary investigation trial pits, groundwater was encountered when the excavation approached the top of the underlying basalt.

Due to the rural aspect of the scheme there are only limited areas of made ground and potential contamination present. There is however an old petrol station in Bruslee which is a potential source of contamination. There are no sites of geological importance (sites which demonstrate specific strata or rock formations) within the study area. However, there are a number of archaeological sites which create ground features and these are considered within the Cultural Heritage Section (Section 3.2).

3.6 Noise

The existing noise environment within the study area is considered as rural in character. The principal noise sources are road-based transport travelling on the existing A8 and the local road network (i.e. motor vehicle movements and the application of compression brakes by heavy vehicles), ground based agricultural operations using farming equipment, and various domestic activities at each residential property. The majority of road traffic in the area uses the existing A8 and therefore current noise levels are highest along the existing A8 alignment.

The following potentially noise sensitive receptors are located within the study area:

- Scattered farmhouses and dwellings throughout the study area;
- Residential properties with direct access or frontage with the existing A8;
- Settlements of Bruslee and Ballynure;
- The Brethren Hall, Bruslee;
- The former Bruslee Primary School, now used as a school IT centre;
- Community facilities in Ballynure, including a primary school and churches; and
- Christ Church, Ballynure, a listed building.

The baseline noise levels for 2008 and 2016 have been established by using road traffic noise prediction software. Within Bruslee and Ballynure noise levels are predicted to range from 75dB at the very edge of the carriageway, to 60dB at a 50m distance away from the road. Along the rest of the A8 the noise levels vary, and reduce as the distance from the A8 increases.

3.7 Effects on all Travellers

The A8 is a nationally important commercial transportation route connecting the Port of Larne to the main centres of Belfast, within Northern Ireland, and Dublin within the Republic of Ireland. As such, the road is heavily used with traffic comprising local commuter traffic between the smaller settlements in the area, and the more strategic destinations of Larne and Belfast, the road also provides for a high volume of heavy goods vehicles (HGVs).

Along both sides of the carriageway there are a limited number of poorly connected shared-use footways and cycleways. Where these exist they end abruptly with no further provision other than a grass verge at the side of the main carriageway. However, footway provision is better within the settlement of Ballynure.

The view from the road for travellers using the A8 can be described as pleasant, based on the rural nature of the landscape and the open views towards the Antrim Coast and Glens Area of Outstanding Natural Beauty. However, the road currently caters for high volumes of road traffic with slow-moving HGVs from the Port of Larne causing platooning along the A8. This can create very long lines of traffic with few gaps, limiting the ability to overtake or turn right, causing delays and driver frustration. There is therefore increased driver stress associated with driving along this section of the A8.

3.8 Community and Private Assets

The population within the study area is relatively small and divided between rural villages and the countryside. The main community settlements are the villages of Ballynure (mid-way along the scheme and intersected by the A8) and Bruslee (to the south of the scheme and also intersected by the existing A8). Local services and facilities for the area are found locally within Ballynure, with specialised services accessible at the settlements of Newtonabbey, Ballyclare and Larne.

Land use within the study area predominately comprises agriculture interspersed by residential and transportation. The principle residential land use feature is the village of Ballynure, with the A8 road forming the main transportation feature. There are three small clusters of industry, one located at Bruslee, one to the west of Ballynure on Church Road and the final is the Loughside Quarry. Settlements and individual residential properties are interspersed regularly through the study area.

3.9 Road Drainage and the Water Environment

The study area for the water environment extends as far west as the Six Mile Water, east to include Castle and Bryantang Water. This area falls within North Eastern and the Neagh Bann River Basin Districts and within the following three river catchment areas:

- Three-Mile Water – the southern part of the study area;
- Six Mile Water – the middle part of the study area, including Ballynure; and
- Inver River – northern part of the study area.

The catchments are drained by a diffuse network of minor watercourses and unnamed land drains which form part of the river systems.

The EC Freshwater Fisheries Directive 78/659/EC has designated Six Mile Water south of Ballyclare, Inver River at Ballyrickard and Castle Water as economically significant as they are important in terms of salmon and trout fishing. In addition, the Six Mile Water south of Ballyclare is designated as a nutrient sensitive area under the Nitrates Directive (91/676/EEC).

The study area has a high density of springs. The frequency of these features reflects generally a shallow depth of groundwater. These high groundwater conditions are also reflected in frequent poorly drained areas across valley bottoms and areas of low lying topography. No groundwater abstractions have been identified within the study area, although two unrecorded private wells are understood to be in use. One is located on the west of the A8 opposite Ballybraken Road, and the second is on the west of the A8 just south of the Park Road Junction.

The Six Mile Water and Inver River floodplains lie within the study area and in order to determine the extent of the 1:100 year flood event, a HEC-RAS model of the Six Mile Water, Inver River and their associated tributaries was developed. The widest part of the 1:100 year floodplain was located at the southern end of the existing A8 near the junction with Drumadowney Road and Rushvale Road. Other areas where the floodplain was modelled to be very wide were upstream of the Moss Bridge and upstream of the Glen Burn/Inver River confluence. The extent of the modelled flooding was attributed in part to the restriction of flow caused by the culvert structures and openings beneath the A8 which the tributaries flow through.

4 Planning Policy and Legislation

The Stage 2 Environmental Assessment Report (as discussed in Section 3) includes a detailed review of current planning policy and legislation. This chapter provides a brief description and overview of the most applicable issues to this proposed road scheme.

4.1 Review of European Policy

Adoption and implementation of European directives is undertaken through national laws. A review has been undertaken of key directives with relevance to the proposed scheme. The key directives are as follows:

- 97/11/EC – Environmental Impact Assessment;
- 92/43/EEC – The Conservation of Natural Habitats and Wild Flora and Fauna;
- 2000/60/EC – The Water Framework Directive; and
- 2003/35/EC – The Public Participation Directive.

4.2 Review of National Planning Policy

The study area and context of the site is such that a range of national planning policy guidance is relevant: this sub-section summarises the most pertinent points of this guidance.

Planning Policy Statements (PPSs) set out policies on land use and other planning matters applicable to the whole of Northern Ireland. These are the responsibility of the Department of Environment and the following PPSs are considered during the assessment and design of the proposed scheme.

- PPS 1 General Principles (March 1998);
- PPS 2 Planning and Nature Conservation June (1997);
- PPS 3 Access Movement and Parking revised (2005);
- PPS 6 Planning, Archaeology and the Built Heritage March (1999);
- PPS 8 Open Space, Sport and Outdoor Recreation March (2004);
- PPS 11 Planning and Waste Management December (2002);
- PPS 13 Transportation and Land Use (2005);
- PPS 14 Draft – Sustainable Development in the Countryside October (2007);
- PPS 15 Planning and Flood Risk (2006); and
- PPS 21 Draft - Sustainable Development in the Countryside (November 2008).

4.3 Review of Regional Planning Policy

The regional planning policy context is set by the Regional Development Strategy (RDS). The RDS sets out a transportation vision for the development of the region. That vision is:

> *"…to have a modern, sustainable, safe transportation system which benefits society, the economy and the environment and which actively contributes to social inclusion and everyone's quality of life".*

Key regional objectives of relevance to this road scheme include:

- **SPG-SRC 2 -** To increase links with neighbouring regions and capitalise on trans-regional development opportunities;
- **SPG-RNI 3** - To support the network of service centres based on main towns, small towns and villages in rural Northern Ireland;

- **SPG-RNI 4** - To create an accessible countryside with a responsive transport network that meets the needs of the rural community; and
- **SPG-RNI 5** - To continue to create and sustain an attractive and unique rural environment in the interests of the rural community and the Region as a whole.

4.4 Review of Local Planning Policy

The local planning policy context is set by the relevant development plans which comprise area plans, local plans and subject plans which apply the regional policies at the appropriate local level. They set out the detailed planning policies and specific proposals for the development and use of land which guide most day-to-day planning decisions and may include additional site specific policies relevant to local circumstances, e.g. sites of local nature conservation importance. The study area is considered within two local plans:

- The Larne Area Plan 2010 (to be replaced by The Antrim, Ballymena and Larne Area Plan 2016); and
- Draft Belfast Metropolitan Area Plan 2012 (BMAP).

The BMAP proposal *PA07 – Strategic Road Scheme A8 and Ballynure South East Link Dualling and Ballynure North East Link* is a specific proposal relating directly to the need for this road improvement scheme. This policy proposal and accompanying map indicates a Protected Area/Corridor along the west of the current alignment of the A8 and to the east of Ballynure for future road improvements.

BMAP also identifies a number of Local Landscape Policy Areas, considered to be of the greatest amenity value, landscape quality or local significance and are therefore protected from undesirable or damaging development. Within the study area, two areas are designated within Ballynure. These are:

- BNE 04: Main Street – Includes locally significant buildings and their surroundings, (Ballynure Methodist Church and manse).
- BNE 05: Ballynure River – Includes a listed building (Christchurch) and its surrounding. It also includes locally significant buildings and their surroundings (the rectory, old mill and school), an archaeological site and its surroundings, associated vegetation and the 'modern church' which is located near the remains of the medieval church and graveyard. Ballynure River is also an area of local nature conservation interest with significant parkland trees.

5 Traffic Assessment

A number of traffic studies have been carried out as part of this scheme assessment. Consequently, there are a number of separate, detailed reports containing the methodologies of traffic work undertaken. The separate reports referred to in this section are as follows:

- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 1 Scheme Assessment Report, 2008*. This report contains the details of the traffic assessment undertaken for the Stage 1 corridor assessment. This early work has been revisited and updated in this report based upon the more accurate traffic forecast modelling undertaken during Stage 2, utilising a SATURN traffic model.
- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Local Model Validation Report, 2008*. This report provides details of the base year SATURN traffic model developed for the Stage 2 assessment and the validation exercise undertaken to satisfy the DMRB requirements.
- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Traffic Forecasting Report, 2009.* The Traffic Forecasting Report provides details of the methodologies, work undertaken and assumptions used for applying traffic growth to the base year traffic and the development of the future year traffic models. The report provides an updated congestion reference flow assessment which provides a validation of the earlier route carriageway assessment (previously included in the Stage 1 Scheme Assessment Report).
- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Junction Strategy Report, 2009.* This report presents the work undertaken as part of a review and rationalisation of junction strategy for the improvement scheme. The study included an assessment of junction locations and a variety of junction forms.

These technical reports remain the overriding source of traffic information for Stage 2, but the key findings of these reports are reproduced in this chapter.

5.1 Existing Traffic Conditions

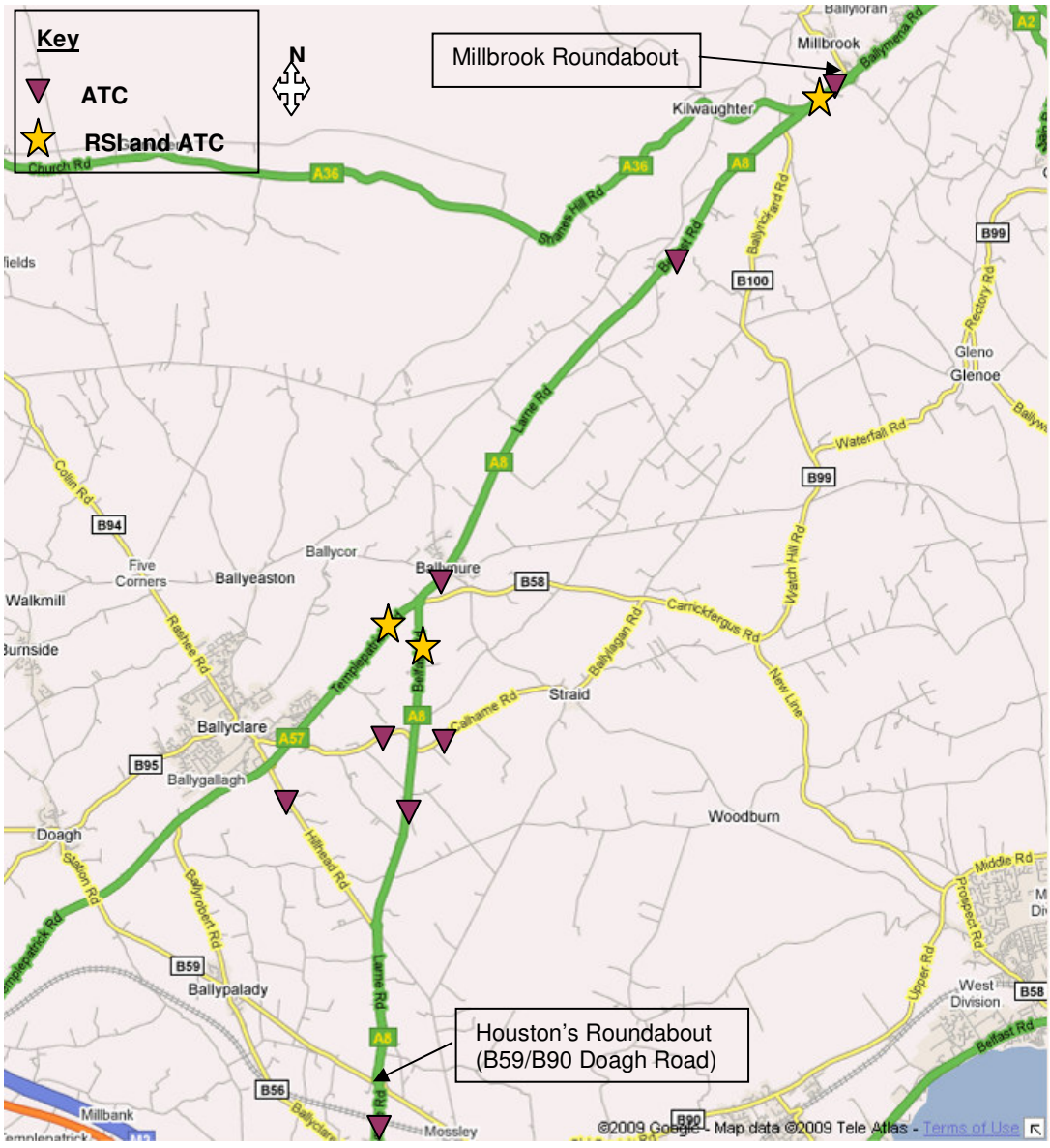
Extensive traffic data collection was required in order to understand the existing traffic conditions on the A8 between the Coleman's Corner Roundabout and the B100 (Ballyrickard Road), traffic surveys were undertaken in spring 2008, as follows:

- **Road Side Interviews (RSIs)** were conducted at three sites along the scheme (as shown on Figure 5.1), during March and April 2008, to collect information on origins and destinations of trips that currently travel along the A8. The surveys were undertaken on weekdays (Monday to Thursday) outside of the Easter holiday period for a 12 hour period from 07:00 to 19:00. Additional surveys were also undertaken on ferries between Larne and Fleetwoood and Cairnryan to provide complimentary survey data to that collected at the other RSI sites.
- **Automatic Traffic Counts (ATCs)** were undertaken for a minimum of two weeks in both directions at each of the RSI sites during spring 2008. In addition to these, there are a number of permanent ATC sites set up on the A8 (as shown on Figure 5.1) and surrounding roads. The ATC data provided information on the traffic flows on the roads in the assessment area. The permanent ATC sites also enable daily, weekly and monthly variations in traffic flows to be monitored.
- **Manual Classified Counts** were undertaken in spring 2008, in addition to the ATCs, at all the major junctions on the A8 between Houston's Roundabout (B59/B90 Doagh Road) and Millbrook Roundabout. The surveys were undertaken

for a 12 hour period from 07:00 to 19:00 and provided information on the number of vehicles travelling through these junctions and their associated turning movements.

- **Journey Time Surveys** were undertaken in spring 2008 along the A8 between Houston's Roundabout (B59/B90 Doagh Road) and Millbrook Roundabout to provide an indication of typical travel times on the A8. A minimum of six journey time surveys were undertaken in each direction in each time period (AM peak, interpeak and PM peak).

Figure 5.1: A8 Traffic Survey Locations



The data collected during these surveys provided information on the existing traffic conditions on the A8 and its side roads. For the Stage 1 Scheme assessment, coarse traffic forecasts were derived by factoring the existing traffic flows on the A8 by future year growth predictions.

For the Stage 2 assessment a more detailed approach to traffic modelling was undertaken using the survey data and developing a 2008 base year SATURN traffic model. The traffic model was developed for three time periods: the AM Peak hour (08:00 to 09:00), the interpeak hour (13:00 to 14:00), and the PM Peak hour (17:00 to 18:00). The base traffic model was coded based on the existing road network and the roadside interview data was used to build trip origin and destination matrices. Assigning the trip matrices onto the model

road network gave the traffic assignment that was validated, in accordance with the DMRB, to provide a representation of existing journey times and traffic flows on the A8 and its side roads.

The development and validation of the base year traffic model is documented in the Local Model Validation Report, referred to above.

The ATC data was used to derive factors to convert modelled time period flows to Annual Average Daily Traffic (AADT) flows for 2008. The AADT flows from the 2008 base year traffic model are shown in Table 5.1.

Table 5.1: Annual Average Daily Traffic Flows from Base Year Traffic Model

Road Description	Direction	Annual Average Daily Traffic (AADT)	Total 2-way AADT
A8 (Coleman's Corner to A57 Templepatrick Road)	Northbound	5,801	11,319
	Southbound	5,518	
A8 (A57 Templepatrick Road to Ballybraken Road)	Northbound	8,218	16,278
	Southbound	8,060	
A8 (Ballybraken Road to B100 Ballyrickard Road)	Northbound	7,458	14,895
	Southbound	7,438	
B95 Hillhead Road	Eastbound	3,031	6,616
	Westbound	3,586	
A57 Templepatrick Road	Eastbound	4,669	9,438
	Westbound	4,769	
B58 Carrickfergus Road	Eastbound	1,677	3,640
	Westbound	1,963	
B100 Ballyrickard Road	Eastbound	1,442	2,860
	Westbound	1,418	
A36 Shaneshill Road	Eastbound	1,470	3,515
	Westbound	2,045	

5.2 Road Safety

Road Traffic Collision (RTC) statistics have been analysed for this section of the A8 under assessment for the four-year period from 2004 to 2007 (the most up to date data available at the time of the Stage 2 assessment). In this period, 43 accidents were recorded and the casualty classifications (as a result of those accidents) are presented in Table 5.2.

The DMRB (Volume 13, Section 1, Part 2) provides accident rates for different standards of road. These theoretical accident rates are given in terms of the number of personal injury accidents per million vehicle kilometres. Statistics on the number of casualties per accident are also provided; they are split according to severity (fatal, serious or slight), which are also dependent on the standard of road.

The recorded RTC statistics have been compared to the default COBA accident rate for a typical single carriageway (S2) road to ascertain how the existing A8 (Coleman's Corner to the B100) safety record compares. This comparison is presented in Table 5.2.

Table 5.2: Observed RTCs Compared Against DMRB Default Accident Rates

2004-2007	Number of Casualties				Number of Accidents
	Fatal	Serious	Slight	Total	
Recorded RTCs 2004 – 2007	6	17	63	86	43
COBA rates (S2 for 2004 – 2007)	4.5	31	146	182	115

It can be seen that the number of accidents recorded on this section of the A8 are approximately a third of what would be expected for this type of road. However, the proportion of fatalities is significantly higher than expected; 12% on the A8 compared to 4% within the COBA rates. In addition, although complete accident data is not available for 2008 and 2009, it should be noted that a further 2 fatal accidents, resulting in four fatalities, are known to have occurred on this section of the A8 since 2007.

A more detailed review of information provided for the accident history and type of accidents highlighted the following:

- over the four year period a total of 43 accidents were recorded along this section of the A8, with 5 of these accidents resulting in fatalities;
- the most common type of accident was a rear end shunt. This is where a vehicle has been reported to run in to the back of a stationary or slow moving vehicle. A number of these accident types occurred when vehicles were turning right;
- more than 20% of accidents were head on collisions;
- the number of accidents has dropped from 2004 to 2007, recording approximately a third of the number accidents in 2007 than in 2004; and
- there would appear to be no significant relationship with the time of day, day of the week or the month that the accidents occurred.

The assessment of recorded accidents on this section of the A8 has shown a much higher than expected proportion of fatalities, although the overall number of accidents is much lower than expected. Although the number of accidents has shown a trend to be reducing over the last few years, the number of fatalities has remained constant.

Based upon this large difference between actual and COBA average accident rates, and the fact the existing road has a high fatality rate, there would appear to be an anomaly in the RTC data received.

5.3 Future Traffic Conditions

The base year model trip matrices were the starting point for the creation of the future year forecast matrices. Factors were applied for traffic growth in future years with adjustments made for traffic generated by new developments. Matrices for three forecast years were created, 2016, (the notional opening year of the scheme), 2023 and 2031 (the design year of the scheme).

The Northern Ireland Strategic Transport Model (NISTRM) traffic forecasts only covers the period up to 2016 and Northern Ireland is excluded from the Department for Transport's (DfT) trip end model program (TEMPRO. Therefore as part of the A5 Western Transport Corridor scheme (WTC) a version of TEMPRO that covers Northern Ireland (TEMPRO NI) was developed.

TEMPRO NI has been developed by consultants Mouchel, who are working on behalf of Roads Service on the A5 Western Transport Corridor project. TEMPRO NI is based on up

to date planning data and has been developed in consultation with the producers of TEMPRO at DfT and their consultants. It was collectively agreed between both parties that TEMPRO NI should be used as the basis of the traffic forecasting undertaken for the A8 Belfast to Larne Dual Carriageway.

The traffic forecasts took account of future predictions in traffic growth, based on the TEMPRO NI, and the traffic growth factors applied to the base year model trip matrix to produce traffic flows in the forecast years. As there is a great deal of uncertainty in predicting future traffic volumes, low and high adjustment factors were applied to the future year trip matrices (in accordance with DMRB and WebTAG guidance) to give a range of flows in which the future year traffic flows could be expected to fall. For the purpose of this Stage 2 Scheme Assessment Report, only the central growth traffic forecasts are presented as these are considered to be the most likely to occur. The Traffic Forecasting Report, referred to above, contains further information on the full range of traffic forecasts.

The forecast trip matrices were then assigned to the future year model network, to produce the traffic forecast flows. Traffic forecasts were produced for the following:

- **The do-minimum network**. This comprised the base year model network amended to include committed highway schemes in the area, which include the works to widen the M2 eastbound from two to three lanes between Junctions 2 and 4.
- **The do-something network**. This was made up of the do-minimum network but with the A8 Belfast to Larne Dual Carriageway scheme included. Traffic forecasts were prepared for three different route options which represent the various different stage 2 routes under consideration: A8 Dual Carriageway with Inner Eastern Bypass around Ballynure; A8 Dual Carriageway with Outer Eastern Bypass around Ballynure; and A8 Dual Carriageway with Western Bypass around Ballynure.

The forecast traffic flows for each route are provided and discussed further within each route assessment (Chapters 9, 10 and 11).

5.4 Assessment of Carriageway Standard

There is no absolute measure that can be said to represent the “capacity” of a link in the highway network; it is simply a matter of decreasing speeds, deterioration of operating conditions, or a declining level of services as perceived by users. In the DMRB, the concept of the Congestion Reference Flow (CRF) is used to provide a measure against which to judge acceptable performance.

As defined by the DMRB TA 46/97, the CRF is the theoretical maximum capacity of a road, and is calculated based upon carriageway width, road gradient, and percentage of HGVs. A CRF assessment of a road compares actual or modelled traffic flows against the CRF flow. If the ratio of flow to CRF is 100%, it is advised that ‘*the carriageway is likely to be congested in the peak periods on an average day’*. However problems may occur before the ratio of flow to CRF is equal to 100%. Journey time reliability is said to be affected and ‘driver stress’ begins to be experienced when the ratio reaches 75% (WebTAG Unit 3.5.7, Section 2). Therefore, for the purposes of this assessment, a ratio of flow to CRF of 75% is taken to be the limit for journey time reliability and is the point at which congestion begins to be experienced.

5.4.1 Do-minimum CRF Carriageway Assessment

The CRF for the existing A8 has been calculated as 21,200 vehicles per day. Table 5.3 provides a summary of the CRF assessment for the existing A8, at Craiginore (between Ballynure and the B100), and forecasts the operational performance of the road for the design years of 2008 (base year), 2016 (opening year) and 2031 (design year). Note that these CRFs are different to those detailed in the Stage 1 Scheme Assessment Report

because these new figures are based on the more detailed Stage 2 SATURN model traffic flows which allows for redistribution of traffic from congested to uncongested routes.

Table 5.3: Existing A8 Congestion Reference Flow Assessment (Do-minimum Network)

Year	Forecast Traffic Flow (Central Growth) (AADT)	Ratio of Flow to CRF (%)
2008	14,200 (observed)	67%
2016	17,803	84%
2031	19,013	90%

The traffic model showed that forecast traffic flows for the short section of the A8 between Ballynure and the A57 (Templepatrick Road) are highest, which result in a maximum ratio of flow to CRF for this section of the A8 of 106% in the design year (2031). Comparison of the 2016 traffic flows in Table 5.3 against the ratio of flow to CRF indicates that operational problems such as unstable flow conditions and unreliable journey times, especially during peak periods, are likely to occur frequently by 2016. The future traffic flows are forecast to exceed the CRF by the year 2031 which will result in significant further deterioration of traffic conditions.

5.4.2 Do-Something CRF Carriageway Assessment

To prove the case for upgrading the A8 to a dual carriageway standard, the CRF has been calculated for the route improvement scheme between Coleman's Corner roundabout and the B100 junction, based on a dual carriageway cross-section for the A8 giving a CRF of 56,000. Table 5.4 below compares the forecast traffic flows on the A8 against the CRF for a dual carriageway at Craiginorne.

Table 5.4: Dual Carriageway Congestion Reference Flow Assessment (Do-Something Network)

Year	Forecast Traffic Flow (Central Growth) (AADT)	Ratio of Flow to CRF (%)
2016	20,379 to 20,675	36%
2031	22,275 to 22,564	40%

Improving the A8 from a single to a dual carriageway road standard would result in a much higher CRF for the route, due to the provision of additional road capacity. The doubling of the number of lanes in each direction, actually leads to a three times increase in the capacity of the road. This additional road capacity would result in a reduction in congestion levels. Table 5.4 indicates that if the A8 were dual carriageway between Coleman's Corner and its junction with the B100 it would still operate within capacity by 2031.

5.5 Junction Strategy

As part of the Stage 2 assessment, a study was undertaken to review junction strategy for the scheme. The study assessed and recommended the locations and forms of junctions along the improved A8. The study is presented in the report entitled *'A8 Belfast to Larne Dual Carriageway, Coleman's Corner to B100 (Ballyrickard Road) Junction Strategy Report'*, 2009.

5.5.1 Key Junctions

It was identified that there were a limited number of side roads and junctions along the A8 that were key to the wider road network and these catered for significantly higher volumes of traffic than the majority of other junctions along the scheme. The locations of these *Key Junctions* were fixed by the existing side road network and the point where the new dual carriageway would cross these existing side roads.

The form of these junctions was considered, and an assessment undertaken to compare roundabouts and full grade separated junctions. The assessment considered the guidance and requirements of the DMRB, the capacity of the different junction forms, and the Government's key objectives of; environment, safety, economy, accessibility and integration. The assessment also considered the option to retain existing infrastructure were possible. The conclusion of this assessment recommended the following *Key Junctions* are provided along the A8.

- **Existing Coleman's Corner Roundabout (B95 Hillhead Road and Camtall Road)** retained with the new dual carriageway connected to the north;
- **New Full Grade Separated Junction at the A57 (Templepatrick Road) or B58 (Carrickfergus Road),** at the point where the new dual carriageway crosses the A57 or B58; and
- **New Roundabout at the A36 (Shaneshill Road) and the B100 (Ballyrickard Road),** joining the A8, the A36 (Shaneshill Road) and the B100 (Ballyrickard Road) in to a single junction.

5.5.2 Intermediate Junctions

The remaining side roads that connect to the existing A8 or are crossed by one of the '*Preferred Corridors'* were classified as *Intermediate Junctions*. Retaining the large number of side roads as full movement junctions would lead to potential safety concerns and additional costs. Therefore an assessment of every side road was undertaken to identify the appropriate level of access:

- All-movement Junction;
- Bridge across the dual carriageway (with no direct access);
- Left-in left-out junction; or
- Closed/stopped up.

The assessment of the *Intermediate Junction* locations considered the location of all-movement junctions based on an assessment of; diversion lengths, side road classification, traffic flows and local access.

The assessment identified four locations, along the A8, for *Intermediate All-movement Junctions.* The form of the *Intermediate All-movement Junctions* was considered, and an assessment undertaken to compare priority junctions and compact grade separated junctions. The assessment considered the guidance and requirements of the DMRB, the capacity of the different junction forms, and the government's key objectives of: environment, safety, economy, accessibility and integration. Roundabouts were discounted because of the delay successive roundabouts would impose on traffic.

The conclusion of the assessment recommended the following *Intermediate All-movement Junctions* are provided along the A8.

- Compact Grade Separated Junction at the B95 (Calhame Road)/ B95 (Green Road)/ Legaloy Road;
- Compact Grade Separated Junction at Ballybraken Road;
- Compact Grade Separated Junction at Moss Road; and
- Compact Grade Separated Junction at a point midway between the existing Deerpark and Park Roads junctions with a new link to Deerpark Road.

The assessment then reviewed the remaining side roads and considered the minimum level of access that could be provided at each location. The assessment concluded five of these should remain open to the A8 but have reduced access provision of left-in left-out junctions

only, and four side roads were stopped up with no access provided to the A8. In addition, the assessment concluded the side roads crossed by the bypass of Ballynure should be bridged over the A8.

5.5.3 Overall Junction Strategy

The recommended junction strategy for the A8 provides a rationalised number of junctions appropriate for a high speed dual carriageway, and should be promoted on the basis of safety, good economic performance and future capacity. The recommended junction strategy is outlined on Table 5.5.

Table 5.5: A8 Junction Strategy Recommendations

Side Road	Junction Category	Junction Form
Coleman's Corner (B95 (Hillhead Road)/Camtall Road)	**Key Junction**	**Roundabout**
Logwood Road	Intermediate Junction	Left-in Left-out Junction
Lisglass Road	Intermediate Junction	Left-in Left-out Junction
Glen Road	Intermediate Junction	Left-in Left-out Junction or Closed
Rushvale Road	Intermediate Junction	Left-in Left-out Junction
Drumadowney Road	Intermediate Junction	Left-in Left-out Junction
B95 (Calhame Road)/B95 (Green Road)/Legaloy Road	Intermediate All-movement Junction	Compact Grade Separated
Straid Road (Eastern Bypass)	Side Road	Bridge Connection Across A8
A57 (Templepatrick Road)/B58 (Carrickfergus Road)	**Key Junction**	**Full Grade Separated**
Castle Road (Eastern Bypass)	Side Road	Bridge Connection Across A8
Church Road (Western Bypass)	Side Road	Bridge Connection Across A8
Lismenary Road (Western Bypass)	Side Road	Bridge Connection Across A8
Ballybraken Road	Intermediate All-movement Junction	Compact Grade Separated
Ballygowan Road (south)	Closed	Closed
Moss Road	Intermediate All-movement Junction	Compact Grade Separated
Ballygowan Road (north)	Closed	Closed
Deerpark Road	Closed	Closed
New Deerpark Road	Intermediate All-movement Junction	Compact Grade Separated
Park Road	Closed	Closed
B100 Ballyrickard Road/A36 Shanes Hill Road	**Key Junction**	**Roundabout**

6 Consultation

Public and stakeholder consultation is a key part of the scheme assessment process, and a thorough and comprehensive consultation strategy has been implemented for this study. The outcome of the consultation process to date is summarised in a number of separate reports as follows:

- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 1 Scheme Assessment Report, 2008*. This report provides details of the public and stakeholder consultation undertaken during the Stage 1 assessment process.
- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009*. This report provides a summary of the consultation undertaken with key stakeholders as part of the Stage 2 environmental assessment.
- *A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Public Consultation Report, 2009.* This report presents the public consultation strategy, details of the events held and the analysis of the responses received.

6.1 Consultation Objectives

A strategy was developed for the consultation process to enable a transparent, flexible and robust approach to enable the public and stakeholders to be engaged in a meaningful way at key stages of the scheme assessment process. The following specific objectives were developed to help guide the consultation process throughout:

- To seek local knowledge and information from the public which may assist in the planning and development of route/corridor options;
- To ensure affected property owners, the local public and other interested stakeholders are provided with sufficient information, as available at the time, about the scheme and the likely impacts so they can provide informed input;
- To ensure appropriate and direct communication with property and landowners to as best possible accommodate their preferences;
- To encourage public support and participation throughout all stages of the scheme assessment to facilitate better and more generally accepted outcomes;
- To provide a range of accessible opportunities for the public to contribute to the scheme assessment process;
- To build an ongoing relationship between Roads Service, the study team and the public in order to gain long term support for the scheme; and
- To provide an effective, open and accountable process.

6.2 Stakeholder Consultation

Relevant statutory and non-statutory consultees were contacted during both the Stage 1 and Stage 2 assessment processes. This included consultation with:

Department of Environment (DoE)

- Northern Ireland Environment Agency
  - Built Heritage;
  - Natural Heritage;
  - Water Management Unit; and

  - Land and Resource Management.
- Planning Service – Belfast and Ballymena Divisional Offices

Department of Agricultural and Rural Development (DARD)

- Rivers Agency
- Branches within
  - Countryside Management Branch;
  - Quality Assurance Branch; and
  - Fisheries Division.

Department of Culture, Arts and Leisure (DCAL)

- Inland Fisheries Unit.

Local Authorities

- Larne Borough Council; and
- Newtownabbey Borough Council.

Others

- Ecological Records Centres; and
- Geological Survey of Northern Ireland - Department of Enterprise, Trade and Investment for Northern Ireland (DETI).

The assistance of these organisations is gratefully acknowledged.

Detailed discussions and consultation on specific topics were undertaken and summarised in the relevant sections of this report, or those specific reports referred to by this report.

6.3 Stage 1 Public Information Events

Public consultation for this scheme began early in the Stage 1 assessment process, where a two-day Public Information event was held to introduce the scheme to the public and key stakeholders. The event was held on the 20th and 21st May 2008. The exhibition focused on the existing engineering and environmental constraints as well as presenting the scheme assessment process.

Approximately 250 people attended the event, with the majority of people being drawn from within the study area. A number of representatives from key stakeholders, local interest groups and local councils also attended.

During and following the public exhibition a number of members of the public and other interested stakeholders provided written feedback on the scheme. The comments received were collated and reviewed from the following sources:

- comment cards from the public exhibitions (including those returned on the day and by post);
- formal letter submissions; and
- telephone calls direct to the Roads Service.

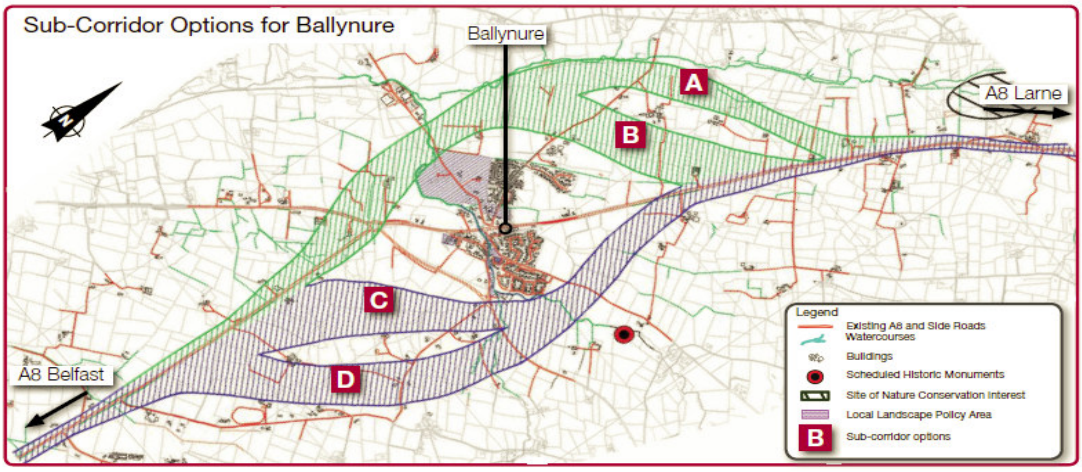
The comments received from members of the public suggested overall scheme design (e.g access arrangements and junction locations) issues were a major concern, and specifically the issues related to potential access onto any new dual carriageway. In addition, the potential impact on residential properties, compensation, and existing safety concerns along the route were also raised by a number of parties.

6.4 Stage 2 Corridor Options Public Consultation Events

6.4.1 Public Exhibition

Early in the Stage 2 process, the recommended corridors from the Stage 1 assessment were presented to the key stakeholders and the public through a 2-day Public Exhibition. The Public Exhibition took place on the 11th and 12th November 2008. The exhibition updated the public and key stakeholders on the progress of the scheme assessment process and focused on the two recommended corridors, and the four sub-corridors (as shown in Figure 6.1).

Figure 6.1: Ballynure Sub-Corridors.



The Public Exhibition event was attended by approximately 350 people over the two days, with a large proportion coming from within the study area. In addition, a number of representatives from key stakeholders, local interest group and local councils also attended the exhibition.

The information presented at the exhibition was condensed and summarised into an A3 leaflet, with a tear-off feedback sheet to seek opinions on the proposals. The feedback sheet asked the following quantitative questions:

1. Do you support the principle of improving the A8 between Coleman's Corner and the B100 Ballyrickard Road. *YES/NO/Unsure*
2. Would you prefer Corridor Option 1 (Green Corridor) or Corridor Option 2 (Purple Corridor) Please tick as appropriate. *Option 1/Option 2*.
3. Would you prefer the carriageway to be dualled online at Bruslee or for a bypass at Bruslee to the east? *Online Bruslee/Bypass Bruslee/No Preference*.
4. Please rank all the sub-corridor options for Ballynure 1 to 4 to signify your order of preference (1 being your preferred option and 4 being your least preferred). *Option A/ Option B/ Option C/ Option D/ No Preference.*

The final section of the form invited additional comments on the proposed corridor options.

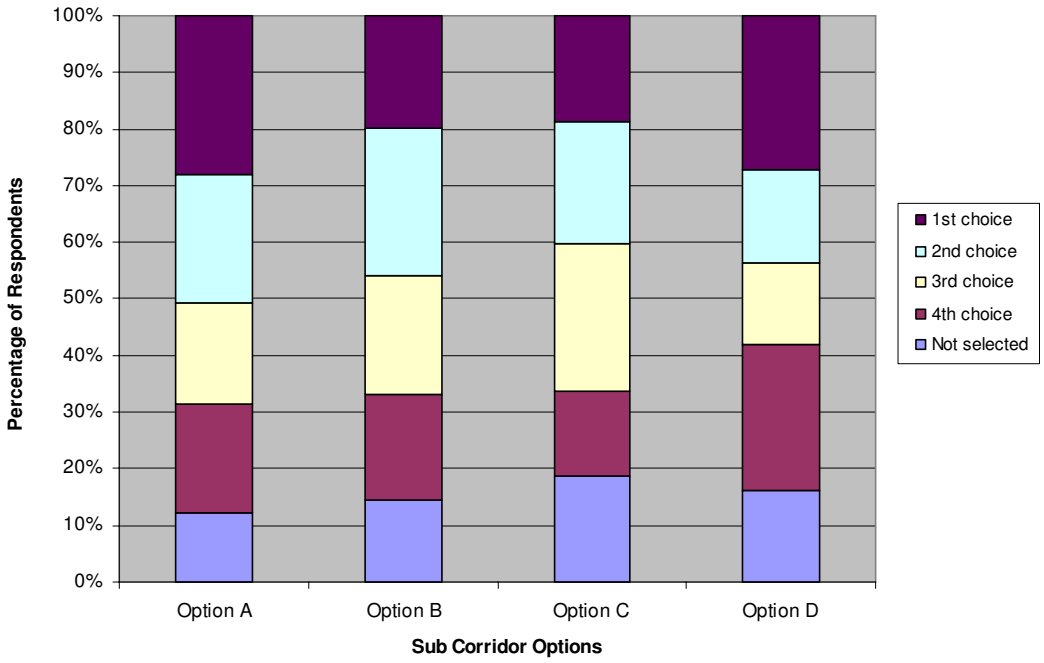
211 people provided written responses to the Stage 1 Corridor Options Consultation with the majority of these people living locally.

The public response to questions posed in the leaflet indicated a majority support for the scheme, with 75% (157 respondents) responding in support of improving the A8. However, the response to the second question regarding which corridor option respondents would prefer was split with 39% indicating Corridor 1 to the west of Ballynure, and 39% indicating Corridor 2 to the east of Ballynure.

For the third question, relating to a bypass of Bruslee, 107 respondents indicated a preference. 53 respondents favoured a bypass and 54 favoured an online solution. The results showed that residents of Bruslee almost wholly had a preference for a bypass, with the residents of the surrounding area (especially to the east) preferring an online solution.

The final question asked the public to rank their order of preference for the four sub-corridor options for Ballynure. Figure 6.2 below, graphically illustrates the results of this question and shows the percentage of respondents who ranked each sub-corridor 1st, 2nd, 3rd and 4th.

Figure 6.2: Respondent's Expressed Preference between the four sub-corridor options at Ballynure.



It can be seen from Figure 6.2 that all sub-corridors have a similar percentage of the public ranking them as 1st, 2nd, 3rd and 4th and therefore there is no clear preference for one sub-corridor over another.

6.4.2 One-to-One On-site Landowner Visits

Further to the Public Exhibition, a comprehensive series of on-site one-to-one visits to all potentially directly affected landowners were undertaken including:

- Private property owners;
- Agricultural landowners;
- Agricultural businesses;
- Non-agricultural landowners; and
- Non-agricultural businesses.

The one-to-one site visits confirmed the general public support for this improvement scheme. However, the site visits highlighted local residents concerns associated with the direct impact to them in terms of restricted access, potential devaluation of their property, and the impact on farm businesses along the existing A8 and around Ballynure.

6.5 Overall Public Consultation Summary

Overall, there is a majority of public support for the A8 improvement scheme. However, there is no clear preference on whether a bypass should be provided for Bruslee and which option should be adopted around Ballynure.

7 Stage 2 Route Options

7.1 Stage 1 Corridor Recommendations

The Stage 1 Assessment recommended two broad corridors for more detailed consideration. These are shown on Drawing A8-HWY-007 in Appendix B and can be described as follow:

- Corridor Option 1 – This corridor seeks to provide for online dualling solutions for the majority of the scheme. However, the corridor goes off-line to the west of Ballynure to provide for a bypass of the village. In addition, the corridor has been widened at the settlement of Bruslee to allow for either online or off-line (to the east of the existing road) solutions in this location.
- Corridor Option 2 – This corridor is the same as Corridor Option 1 for the majority of the scheme, however it goes off-line to the east of Ballynure to provide for the bypass of the village.

The recommended corridors were developed based on a range of constraints identified during the Stage 1 Assessment. The corridors developed during Stage 1 were of varying widths to accommodate a number of potential routes. At the end of the Stage 1 Assessment these wide corridors to the east and west of Ballynure were split to allow for more focused public consultation on narrower corridors with less potential routes (as outlined in Section 6.4.1 and shown on Drawing A8-HWY-008 in Appendix B).

7.2 Stage 2 Routes Options

The Stage 2 Assessment has developed a range of routes within the recommended corridors based on the key constraints and features identified. All the routes were initially assessed and those which had significant impacts or where other routes were considered to perform broadly the same function with less impact were discounted at an early stage.

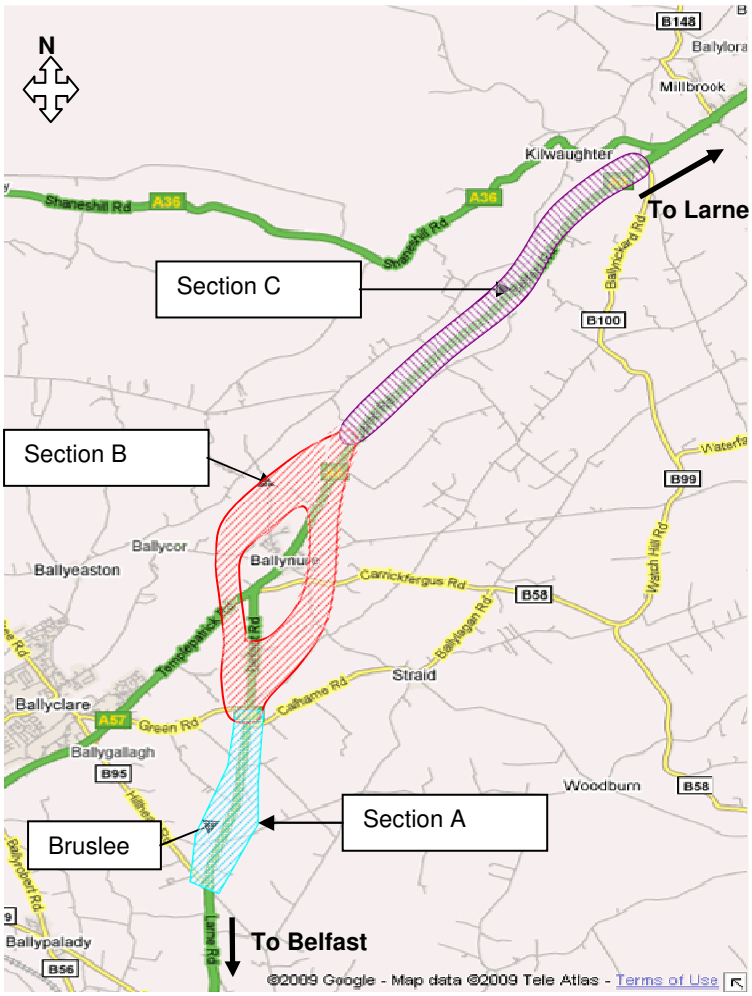
For the Stage 2 assessment, the scheme has been split into three sections, as shown on Figure 7.1. The reasons for this are that there are two sections along the scheme (Bruslee and Ballynure) which require a number of routes to be considered. This approach enables an isolated assessment of the different routes within each section. The 'Preferred Route' for the overall scheme would therefore be an amalgamation of the best route for each of the three sections. The three sections considered are:

- Section A, Bruslee Section – Coleman's Corner Roundabout to Calhame Road
- Section B, Ballynure Section – Calhame Road to Junction Lane
- Section C, Northern Section – Junction Lane to B100 (Ballyrickard Road)

The development of the routes for each section considered the various constraints within the Stage 1 'Preferred Corridors'.

Section B considers the route options around Ballynure and the opportunities to provide a bypass to either side (east or west) of the village. The constraints are different on each side of the village and therefore the part of this chapter which considers Section B has been split over two sub-chapters, Section 7.4 and 7.5, for the eastern and western bypass routes respectively.

Figure 7.1: Stage 2 Assessment Sections



It should also be noted that all routes are described from south to north and the chainages stated in the individual route descriptions below are specific to the individual route being described, and therefore all routes start with a zero chainage whether they are in Section A, B or C.

7.3 Section A Route Options

Section A considers the route options available from the most southern end of the scheme to just north of the small settlement of Bruslee. The proximity of residential and commercial properties to the existing A8 within Bruslee represents a major constraint for any online option. Therefore the Stage 2 Assessment has considered both online and off-line route options, and three routes have been assessed:

- Route A1 - Online Improvement Bruslee;
- Route A2 - Inner Eastern Bypass of Bruslee; and
- Route A3 - Outer Eastern Bypass of Bruslee.

The key engineering and environmental considerations for this section of the scheme are as follows:

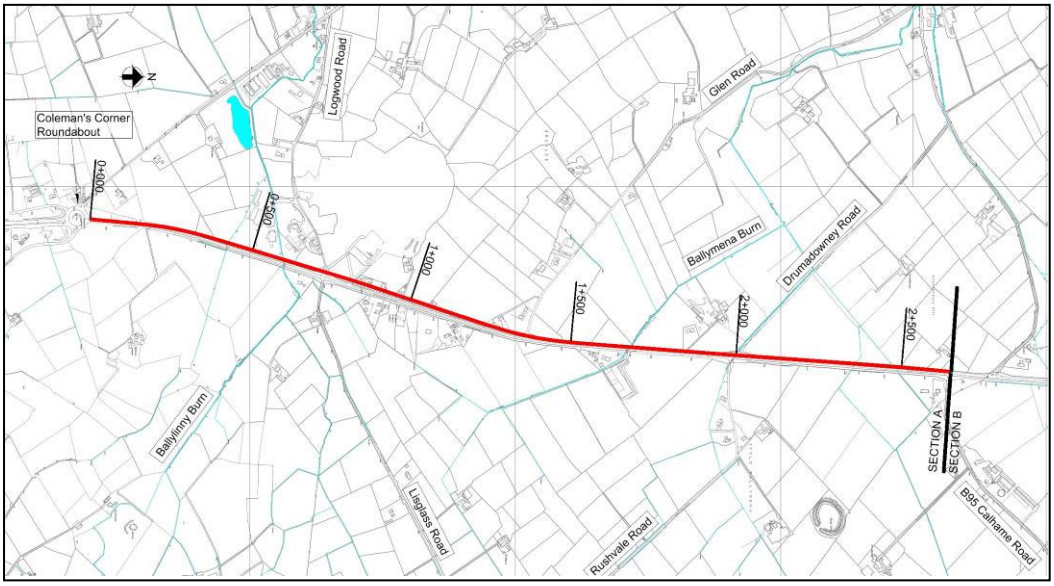
- Proximity of and impact on existing residential and commercial properties;
- Tree Preservation Order on Lisglass Road (as outlined in Section 3.3);
- Existing protected route within BMAP (as outlined in Section 4.4);
- Existing utilities (as outlined in Section 2.5); and

- Impact on agricultural land and farm businesses.

7.3.1 Route A1 - Online Improvement through Bruslee

Route A1 (shown on Figure 7.2) follows the western edge of the Preferred Corridor and would provide an online solution for Section A. It would involve widening the existing carriageway to the west between Coleman's Corner roundabout and the B95 (Calhame Road) utilising the Protected Route within BMAP. Route A1 is shown superimposed on the Preferred Corridors on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-001 in Appendix B.

Figure 7.2: Route A1 Plan



This route would extend north along the existing A8 from the Coleman's Corner roundabout (Section 5.5) making best use of the existing carriageway and land currently owned by Roads Service. The route would cross Ballylinny Burn and one of its tributaries before passing Logwood Mill Plant Centre and East Antrim Metals and Fabrications. Land would be required from both these commercial premises for the widening, and the existing East Antrim Metals and Fabrications access on the A8 would require diversion onto Logwood Road.

Just to the north of East Antrim Metals and Fabrication, approximately Ch 0+720, a new left-in left-out junction (as outlined in Section 5.5) would be provided connecting Logwood Road and Lisglass Road to the A8. The route would then continue north from this point, widening to the west of the existing carriageway. This section of the route, between Logwood Road and Glen Road (Ch 0+720 and Ch 1+370), would require the demolition of 5 dwellings (Nos. 75, 79, 85, 89 and 91/93 Belfast Road), and the Community Hall, and require some land take from the Bruslee Recycling Centre.

Direct access onto the dual carriageway would be restricted and therefore a small section of existing carriageway on the east would be maintained to provide a local access road, connecting to Lisglass Road, to serve the remaining properties along the eastern side of the A8. The remaining businesses and properties along the western side of the A8 would be served by new access roads onto Logwood Road. Access to Glen Road from the new dual carriageway would be provided through a left-in left-out junction (as outlined in Section 5.5).

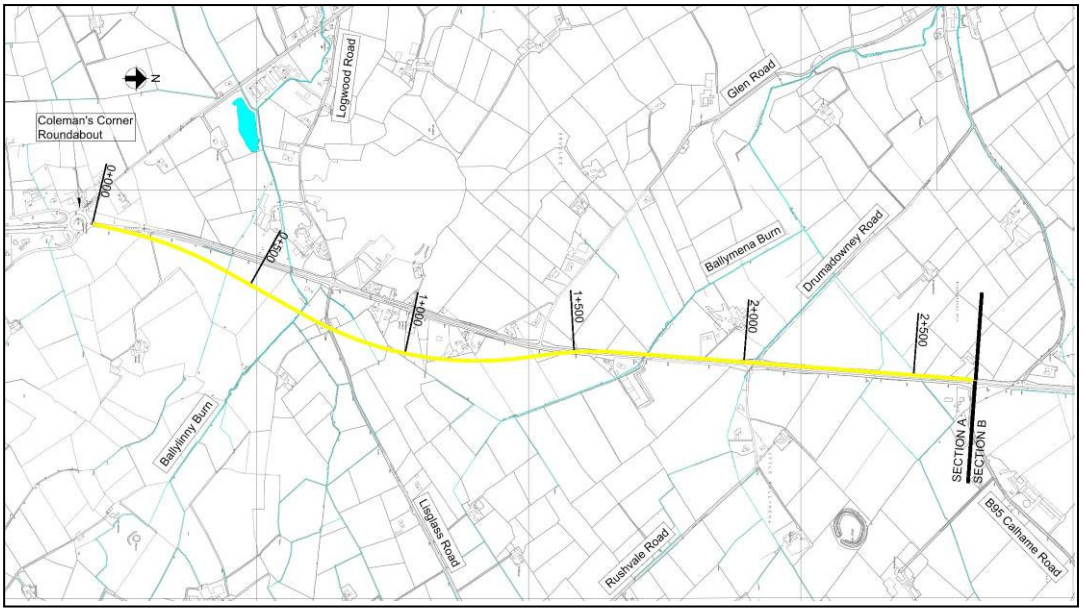
Continuing north, the online improvement would continue along the western side of the existing A8, crossing the Ballymena Burn and two of its tributaries, and connecting with Drumadowney Road via a new left-in left-out junction (Ch 2+000), before reaching the B95 (Calhame Road) (Ch 2+650). The majority of land that would be required for the widening between Glen Road and Calhame Road is agricultural land. However, the route would move

the A8 closer to two properties (Nos. 55 and 67 Belfast Road) and require some land take from their gardens.

7.3.2 Route A2 - Inner Eastern Bypass of Bruslee

Route A2 (shown on Figure 7.3) passes through the middle of the Preferred Corridor and would provide an *inner* bypass of Bruslee. The route leaves the existing alignment after Coleman's Corner roundabout and rejoins the existing road just north of the Glen Road junction, with the remainder of the route comprising online widening to the west of the existing carriageway. Route A2 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-002 in Appendix B.

Figure 7.3: Route A2 Plan



Route A2 would move off-line to the east of the existing A8 after Coleman's Corner roundabout following the eastern edge of the Preferred Corridor, and cross Ballylinny Burn and one of its tributaries before intersecting with Lisglass Road (Ch 0+760). At this point there would be a left-in left-out junction between the Lisglass Road and the new dual carriageway (as outlined in Section 5.5). The route would cross the Lisglass Road approximately 125m to the east of the A8 and crosses the site of a proposed replacement dwelling for No. 6 Lisglass Road.

Route A2 would then continue, through the middle of the Preferred Corridor, and around the east of Bruslee, remaining relatively tight (between 20m and 50m) to the back of the properties on the east of the existing A8. The dual carriageway would then rejoin the existing A8 to the north of the Glen Road junction, immediately prior to two residential properties at approximately Ch 1+600 (No. 68 and 70 Belfast Road)..

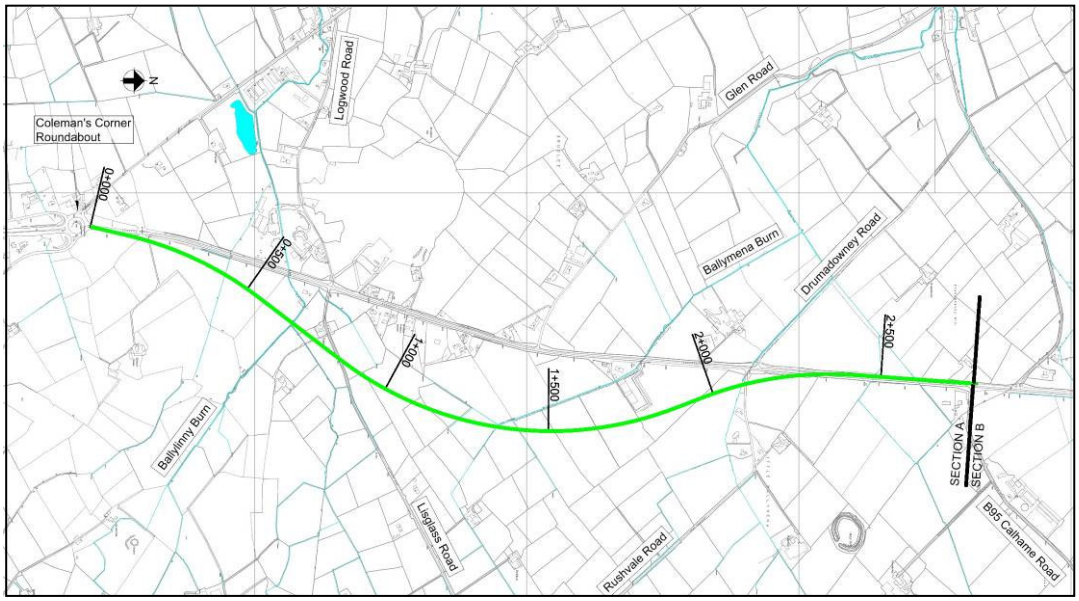
The route would then be the same as Route A1 up to the B95 (Calhame Road).

The redundant A8 through Bruslee would be retained to serve local properties and businesses. This section of the A8 would be connected via an all-movement priority junction to the B95 (Hillhead Road) to the west of Coleman's Corner roundabout, allowing access from the south. In addition, a left-in left-out junction would be provided with the new dual carriageway accommodating traffic heading north (as outlined in Section 5.5).

7.3.3 Route A3 - Outer Eastern Bypass of Bruslee

Route A3 (shown on Figure 7.4) follows the eastern edge of the Preferred Corridor and would provide an *outer* bypass of Bruslee leaving the existing alignment after Coleman's Corner roundabout and rejoining the existing road just north of the Rushvale Road and Drumadowney Road Junction, with the remainder of the route online widening to the west of the existing carriageway. Route A3 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-003 in Appendix B.

Figure 7.4: Route A3 Plan



Route A3 would start as Route A2 leaving Coleman's Corner roundabout (along the eastern edge of the Preferred Corridor), crossing Ballylinny Burn and one of its tributaries, before intersecting with Lisglass Road (Ch 1+820). At the intersection point with Lisglass Road Route A3 would be aligned further to the east resulting in it being, approximately 200m from the existing A8. This route would also cross the site of the proposed replacement dwelling for No. 6 Lisglass Road. As with Route A2 there would be a left-in left-out junction between the Lisglass Road and the new dual carriageway (as outlined in Section 5.5).

Route A3 would continue north from Lisglass Road crossing agricultural land to the east of the village, along the eastern edge of the Preferred Corridor. The route would be approximately 160m from the residential properties along the eastern side of the A8; it would then cross Ballymena Burn, and one of its tributaries, before intersecting with Rushvale Road. At this point a left-in left-out junction would be provided with Rushvale Road, and another left-in left-out junction provided on the western side of the dual carriageway connecting the old A8 and Drumadowney Road (as outlined in Section 5.5). The route would then continue north rejoining the existing A8 approximately 200m north of Rushvale Road (Ch 2+300).

The route would then be the same as Route A1 up to the B95 (Calhame Road).

The old section of the existing A8 through Bruslee would be retained in a similar manner to Route A2, to serve local properties and businesses. The connection of the old A8 to the surrounding road network would be similar with an all-movement connection at the south and a left-in left-out junction at the northern end (as outlined in Section 5.5).

7.3.4 Other Section A Routes Considered and Rejected

7.3.4.1 Online Improvement Through Bruslee to the East of the Existing A8

A route which widened the existing carriageway to the east through Bruslee was considered and discounted at an early stage. The route would have required the demolition of a greater number of properties than Route A1 and would have impacted on further properties through loss of gardens. There would also have been a greater impact on the existing utilities in the eastern verge of the A8 and the route would have deviated from the Protected Route along the western verge of the existing A8. The route was therefore discounted because there was another online widening route available (Route A1) with less impact on property and utilities which utilised the Protected Route.

7.3.4.2 Online Improvement Through Bruslee on Both Sides of the Existing A8

A route which widened the existing carriageway on both sides of the existing A8 was also considered and discounted at an early stage. The route would have a larger impact on residential properties than either Route A1 or the alternate widening route outlined in Section 7.3.4.1. The route was therefore similarly discounted in favour of Route A1.

7.4 Section B (Western Bypass) Route Options

Section B Western Bypass considers the route options available for a bypass to the west of Ballynure. The Stage 2 assessment has considered four routes to the west of Ballynure:

- Route B1 - Outer Western Bypass of Ballynure;
- Route B2 - Inner South-western Bypass of Ballynure;
- Route B3 - Inner North-western Bypass of Ballynure; and
- Route B6 - Hybrid Inner Western Bypass of Ballynure.

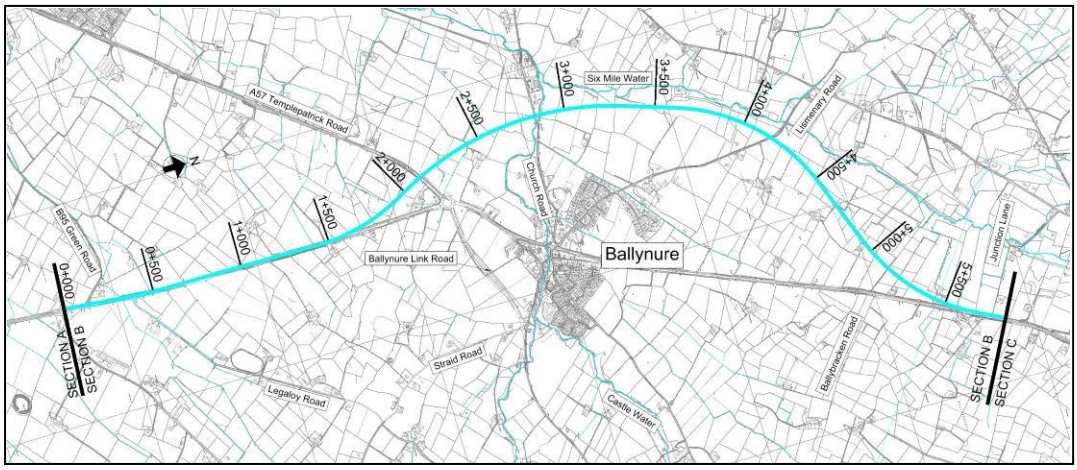
The key considerations for this section of the scheme are as follows:

- Proximity of and impact on existing residential properties;
- Watercourses (Ballynure Water and Six Mile Water tributaries); and
- Impact on agricultural land and farm businesses.

7.4.1 Route B1 - Outer Western Bypass of Ballynure

Route B1 (shown on Figure 7.5) would provide an outer bypass to the west of Ballynure leaving the existing alignment approximately 550m south of the existing A57 (Templepatrick Road) roundabout, and following close to the western edge of the Preferred Corridor. The route would then initially head northwest before following the Six Mile Water around the village and then rejoining the existing A8 prior to Junction Lane. Route B1 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-004 in Appendix B.

Figure 7.5: Route B1 Plan



Route B1 would start at the B95 (Calhame Road), the termination point of Section A, and would continue widening the existing carriageway to the west through to a new compact grade separated junction with the B95 (Calhame Road), B95 (Green Road) and Legaloy Road (as outlined in Section 5.5). The route would also cross the Green Burn between Green Road and Legaloy Road (Ch 0+400).

Continuing north from Legaloy Road, the route would continue along the line of the existing A8 for another 1.1km, before it moves off-line to the west to bypass Ballynure (Ch 1+500). At this point the route would require the demolition of an old stone farm out-building/barn situated adjacent to the existing road. The route would then cross agricultural land, following the western edge of the Preferred Corridor, before passing between two clusters of buildings and intersecting with the A57 (Templepatrick Road) approximately 175m to the west of the existing A8/A57 roundabout. A full grade separated junction would be provided at this point (as outlined in Section 5.5).

From the proposed A57 (Templepatrick Road) full grade separated junction the route would pass into the Six Mile Water valley, crossing the Ballynure Water at approximately Ch 2+850. The new dual carriageway would bridge Church Road and Ballynure Water with no access from Church Road being provided onto the new dual carriageway (as outlined in Section 5.5).

Route B1 would follow the western edge of the Preferred Corridor around the west of Ballynure and run parallel to the Six Mile Water across agricultural land until it intersects with Lismenary Road, approximately 120m to the east of the Six Mile Water. There would be no connection between Lismenary Road and the dual carriageway; however Lismenary Road would remain open and the dual carriageway would likely be bridged over this side road.

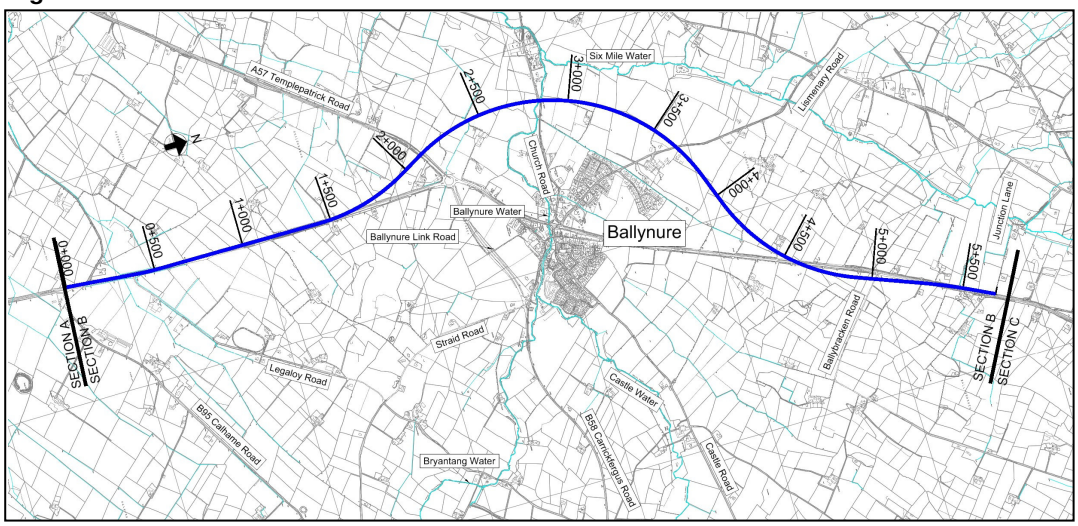
North of Lismenary Road the route would move eastwards climbing away from the Six Mile Water back towards the existing A8. The route would pass behind No. 36 Larne Road, before going in front of No. 42 Larne Road, and rejoining the existing A8 immediately prior to Junction Lane.

A new compact grade separated junction would be provided between the new dual carriageway with Ballybraken Road and the original A8 carriageway (as outlined in Section 5.5). At the end of Ballybraken Road the Route B1 would still be off-line and therefore this junction would be located approximately 150m to the west of the existing junction, with a new road connecting the junction to the old A8 and Ballybraken Road.

7.4.2 Route B2 - Inner South-western Bypass of Ballynure

Route B2 (shown on Figure 7.6) would provide an inner bypass to the west of Ballynure leaving the existing alignment approximately 550m south of the existing A57 (Templepatrick Road) roundabout. The route would then head northwest, before being aligned around close to the edge of Ballynure, and rejoining the existing A8 approximately 400m before Junction Lane. Route B2 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-005 in Appendix B.

Figure 7.6: Route B2 Plan



The route would be the same as Route B1 from the B95 (Calhame Road) until 300m prior to the crossing of Church Road and Ballynure Water (Ch 2+550). At this point Route B2 would continue tighter to Ballynure instead of pushing further away from the village toward the Six Mile Water. The route would cross Ballynure Water at the point where Church Road crosses the watercourse, with no connection to the dual carriageway being provided. The route would continue around the village across agricultural land passing to the west of a farm off Church Road (No. 21 Church Road).

Continuing north, the route would cross more agricultural land before intersecting with Lismenary Road on the edge of Ballynure. As the route crosses Lismenary Road it would require the demolition of a residential property (No. 19a Lismenary Road). There would be no connection between the new dual carriageway and Lismenary Road with a structure provided to carry the new dual carriageway over or under Lismenary Road.

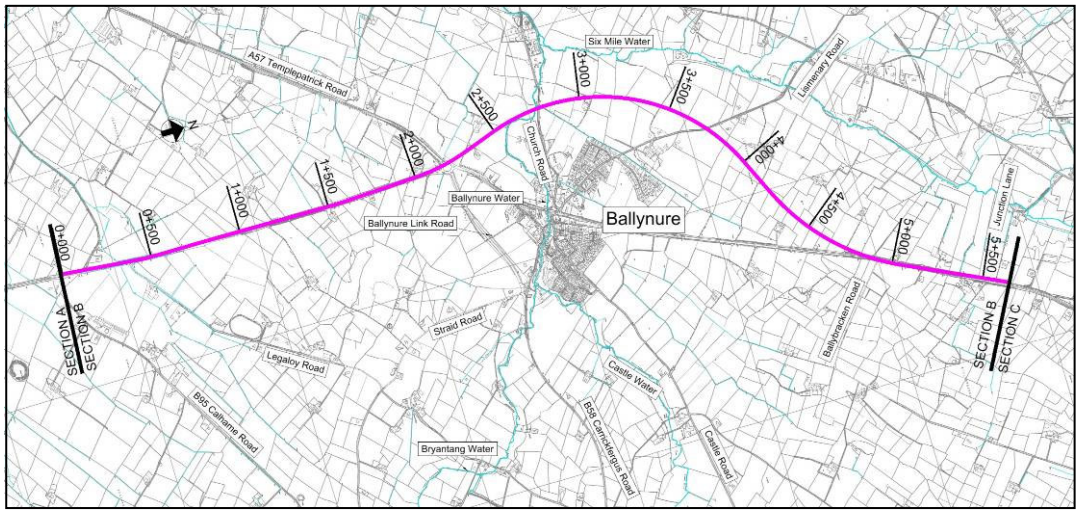
Route B2 would then continue in a northeast direction, crossing farm accesses at both No. 24 and No. 26 Larne Road. The route would then cross over the existing A8 for geometric reasons, to the east, before rejoining A8 300m north of the Ballybraken Road.

A new compact grade separated junction would be provided between the new dual carriageway, Ballybraken Road and the old A8 carriageway (as outlined in Section 5.5).

7.4.3 Route B3 - Inner North-western Bypass of Ballynure

Route B3 (shown on Figure 7.7) would also provide an inner bypass to the west of Ballynure similar to Route B2. However, Route B3 would stay online for a greater length and leave the existing A8 alignment at the location of the existing A57 (Templepatrick Road) roundabout. The route would then head northwest coming closer to the edge of Ballynure before rejoining the existing A8 approximately 650m before Junction Lane. Route B3 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008 and in more detail on Drawing A8-S2-HWY-006 in Appendix B.

Figure 7.7: Route B3 Plan



The route would be the same as Route B1 from the B95 (Calhame Road) until approximately Ch 1+500 (where route B1 moves offline). At this point Route B3 would continue along the existing line of the A8, widening a small amount on both sides of the road, to where the existing A57 (Templepatrick Road) roundabout (Ch 2+150) is located. This roundabout would be replaced with a new grade separated junction and from this point the route would continue around Ballynure to the west, passing between Nos. 15 and 17 Belfast Road, before dropping down towards Ballynure Water. The route would impact on a 100m section of Ballynure Water, requiring its realignment, before crossing Ballynure Water and Church Road to the east of the village with no connection being provided between the two roads.

Route B3 would then continue north passing just to the west of a farm off Church Road (No. 21 Church Road), before continuing across agricultural land to Lismenary Road. Route B3 would cross Lismenary Road approximately halfway between No. 19a and No. 21 Lismenary Road. The new dual carriageway would be bridged either over or under Lismenary Road with no connection being provided between the two roads (as outlined in Section 5.5).

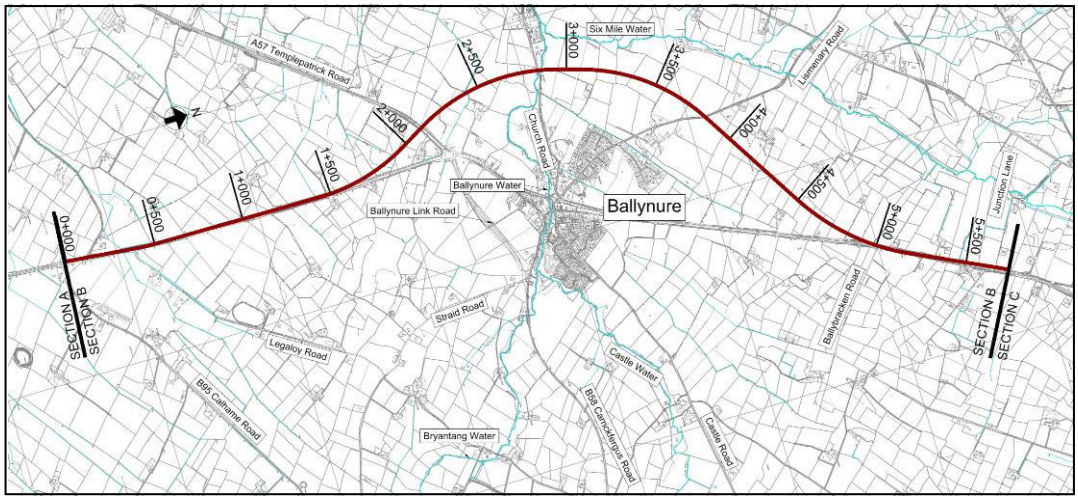
North of Lismenary Road the route would continue across agricultural land crossing two farm accesses (No. 24 and 32 Larne Road) before rejoining the existing A8 in the vicinity of the Ballybraken Road junction. A new compact grade separated junction would be provided between the new dual carriageway, the Ballybraken Road and the redundant A8 carriageway at this point (as outlined in Section 5.5). The junction would be located at the end of Ballybraken Road with a parallel road connecting the original A8 to Ballybraken Road.

Route B3 would then continue along the line of the existing A8, initially widening the existing carriageway on the east to minimise the impact on No. 36 Larne Road, and then on the west to minimise the impact on the cluster of properties just to the south of Junction Lane.

7.4.4 Route B6 - Hybrid Inner Western Bypass of Ballynure

Route B6 (shown on Figure 7.8) would also provide an inner bypass to the west of Ballynure, and is a combination of Routes B2 and B3. Route B6 is the first half of Route B2 and the second half of Route B3, therefore incorporating the halves of those routes with least impacts. Route B6 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-009 in Appendix B.

Figure 7.8: Route B6 Plan



7.5 Section B (Eastern Bypass) Route Options

Section B Eastern Bypass considers the route options available for a bypass to the east of Ballynure. The Stage 2 assessment has considered two routes to the east of Ballynure:

- Route B4 - Inner Eastern Bypass of Ballynure; and
- Route B5 - Outer Eastern Bypass of Ballynure.

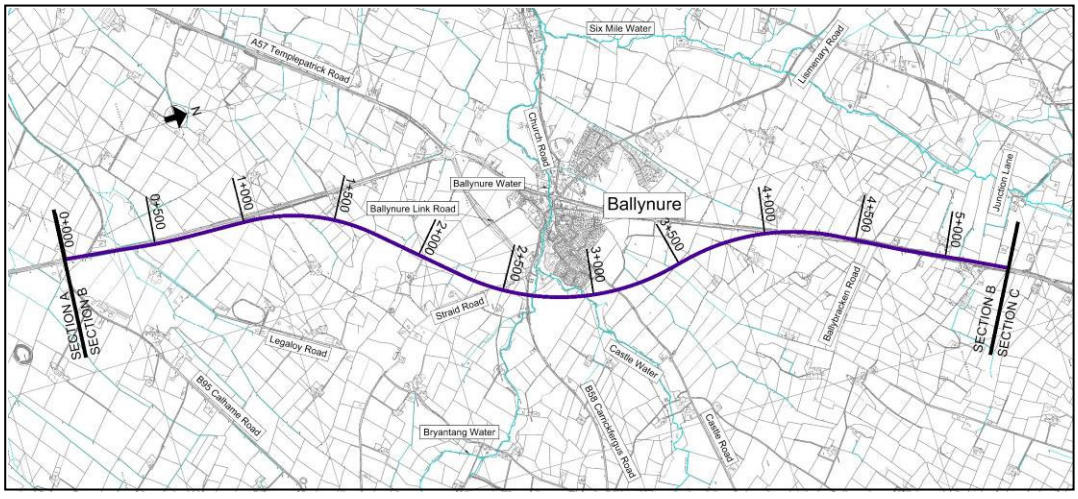
The key considerations for this section of the scheme are as follows:

- Proximity of and impact on existing residential properties;
- Watercourses (Castle Water and Bryantang Water); and
- Impact on agricultural land and farm businesses.

7.5.1 Route B4 - Inner Eastern Bypass of Ballynure

Route B4 (shown on Figure 7.9) would provide an inner bypass to the east of Ballynure leaving the existing corridor just to the north of Legaloy Road. The route would then head northeast, before coming tight to the edge of Ballynure, and rejoining the existing A8 approximately 500m before Ballybraken Road. Route B4 is shown superimposed on the 'Preferred Corridors' on Drawing A8-HWY-008 and in more detail on Drawing A8-S2-HWY-007 in Appendix B.

Figure 7.9: Route B4 Plan



The route would start the same as the other Section B routes with a compact grade separated junction with the B95 (Calhame Road)/ B95 (Green Road) and Legaloy Road.

The route would then move off-line to the east at approximately Ch 1+000. The redundant A8 would be retained to provide local access to Ballynure and the land currently served by the road.

Route B4 diverges from the existing A8 at approximately Ch 1+000. At this point the route would head northwest, before intersecting with the Straid Road (Ch 2+000) and the B58 Carrickfergus Road (Ch 2+100). One residential property would be demolished (No.4 Straid Road) with this option.

A full grade separated junction would be provided with the B58 (Carrickfergus Road) and the Straid Road would be connected in to the Carrickfergus Road in the vicinity of this junction.

Immediately after the B58 (Carrickfergus Road) the route would cross the Bryantang Water before staying close to the east of Ballynure and crossing the Castle Water (Ch 2+950). Route B4 would then cross the Castle Road to the east of the village, with no connection being provided between the two roads.

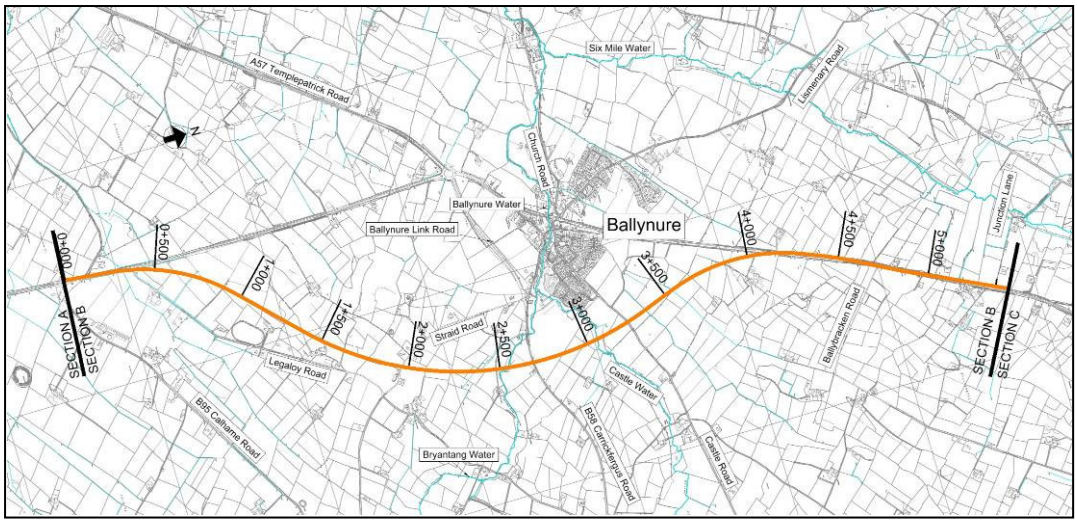
Continuing around Ballynure, the route would head northwest before rejoining the A8 approximately 500m before Ballybraken Road. A new compact grade separated junction would be provided between the new dual carriageway and the Ballybraken Road and the redundant A8. This junction would be located at the end of the Ballybraken Road with a parallel road to the west connecting the redundant A8 into this junction.

Route B4 would then be the same as Route B3 for the next 600m.

7.5.2 Route B5 - Outer Eastern Bypass of Ballynure

Route B5 (shown on Figure 7.10) would provide an outer bypass to the east of Ballynure leaving the existing corridor immediately after the existing Legaloy Road junction. The route would then head northeast, before coming near the edge of Ballynure, and rejoining the existing A8 some 500m before Ballybraken Road. Route B5 is shown superimposed on the 'Preferred Corridors' on Drawing A8-HWY-008 and in more detail on Drawing A8-A2-HWY-008 in Appendix B.

Figure 7.10: Route B5 Plan



Route B5 would start the same as Route B4 with a compact grade separated junction linking the dual carriageway to the B95 (Calhame Road), B95 (Green Road) and Legaloy Road. However, immediately after the Legaloy Road the route would leave the existing A8 corridor before heading northeast, running parallel to the Legaloy Road, towards the Straid Road. The route would intersect Straid Road approximately 200m to the west of the existing Straid Road and Legaloy Road junction. The dual carriageway would cross Straid Road with no connection provided between the two roads.

Heading north the route would cross the Bryantang Water (2+500) before intersecting the B58 (Carrickfergus Road) and the proposed full grade separated junction. Route B5 would then continue northwest before crossing Castle Water (3+100) and Castle Road (3+200), with no connection provided between the two roads (as outlined in Section 5.5).

Route B5 would then be the same as Route B4 up to the Ballybraken Road junction and the end of Section B.

7.5.3 Other Section B (Eastern) Routes Considered and Rejected

7.5.3.1 Tight Inner Eastern Bypass of Ballynure

A route which used the minimum radii allowed for a 120km/hr design speed (within DMRB) to the east of Ballynure was considered and rejected at an early stage. The route came tighter to the southeast of Ballynure village and closer to the western edge of the eastern Preferred Corridor. The route was discounted because it would have required the demolition of a farm (No. 30 Belfast Road) located on the east of the existing A8 and caused greater agricultural land severance than Route B4.

7.6 Section C Route Options

Section C considers the route options to the north of Ballynure. The Stage 1 study recommended corridors that were relatively narrow for this section of the scheme and allowed for an online solution with the potential for several short off-line sections to avoid certain constraints. A number of sub-routes were considered and discounted at an early stage (see Section 7.6.2), and therefore the Stage 2 Assessment has only considered one route:

- Route C1 - Online Improvement Northern Section.

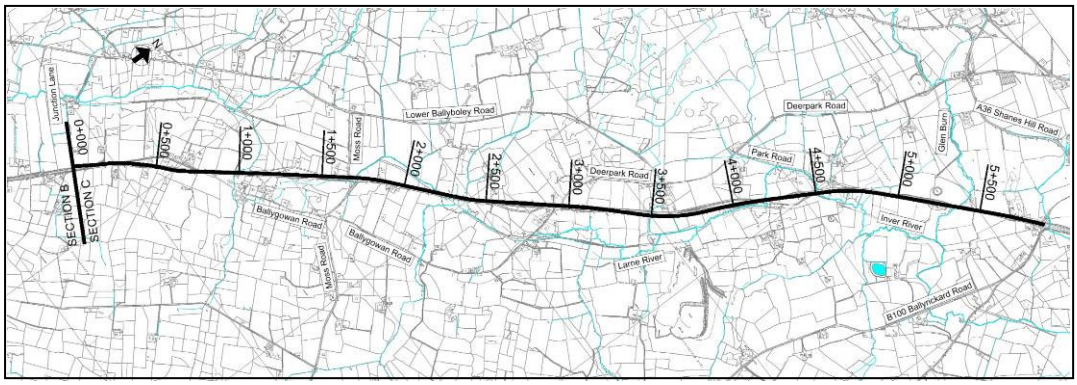
The key considerations for this section of the scheme are as follows:

- Proximity of and impact on existing residential properties adjacent to the A8;
- Lowtown Rath and Souterrain;
- Clements Wood;
- Watercourses;
- Existing utilities (as outlined in Section 2.5); and
- Impact on agricultural land and farm businesses.

7.6.1 Route C1 - Online Improvement Northern Section

Route C1 (shown on Figure 7.11) follows the existing A8 and would provide an online solution for Section C. The route gradually weaves from one side of the existing A8 to the other to minimise the impact on buildings and residential properties along the existing road. Route C1 is shown superimposed on the 'Preferred Corridors' on Drawings A8-HWY-008, and in more detail on Drawing A8-S2-HWY-010 in Appendix B.

Figure 7.11: Route C1 Plan



Route C1 would start at Junction Lane, the termination point of Section B, widening to the west of the existing A8. The route would then move across the A8 to the east before reaching the Old Larne Road on the west of the existing route. The route would then reach the existing southern junction with the Ballygowan Road which would be closed with no access.

Continuing north, the route would move back across the existing A8 corridor to the west before reaching Moss Road (Ch 1+650). A further residential property located on the corner of the existing A8 and Moss Road would require to be demolished (No. 78 Larne Road). A new compact grade separated junction would be provided with the Moss Road at this point.

Beyond Moss Road Route C1 would continue widening to the west, and require the demolition of a further derelict building (approximately Ch 1+800, No. 84 Larne Road) and another residential dwelling (approximately Ch 2+150, No. 92 Larne Road), before reaching the existing Deerpark Road/Ballygowan Road junction. Access from these side roads to the A8 will be removed and the side roads closed.

North of Deerpark Road, the route would move across to the east of the existing alignment before passing a cluster of properties located on the west of the A8 opposite Loughside Quarry. At this point a new compact grade separated junction would be provided with a link road connecting it to the Deerpark Road and Lower Ballyboley Road.

The route would then continue north, crossing the Larne River twice within 400m (approximately Ch 4+150 and Ch 4+500), before reaching the existing junction with Park Road which would be closed. The final 1.5km of the route would involve widening slightly on both sides of the existing A8, with Route C1 passing between the Lowtown Rath and Souterrain and the buildings opposite at approximately Ch 5+250. Route C1 would then tie into the existing dual carriageway.

A new roundabout would be provided midway between the existing B100 (Ballyrickard Road) and A36 (Shaneshill Road) junctions. Both these side roads would be connected into the roundabout, with the severed sections of road retained to provide access to land and residential properties.

7.6.2 Other Section C Sub-Routes Considered and Rejected

7.6.2.1 Offline Route to the East of the Existing A8 at Moss Road

A 1.2km off-line route to the east of the existing A8 in the vicinity of Moss Road was considered but rejected at an early stage. At this location there are several properties located close to the existing A8 on both sides of the road. A route was considered that would have moved off-line from the existing A8 to the east to limiting the impact on these properties. This route was however discounted following discussions with the potentially affected landowners about the likely impacts on their property, and because of the impact on the environment and land severance which would have been caused by an off-line route.

7.6.2.2 Offline Route to the East of the Existing A8 Between Park Road and Ballyrickard Road

An off-line route to the east of the existing A8 in the vicinity of the Lowtown Rath and Souterrain was considered but rejected at an early stage. There is a cluster of farm buildings including a residential property (No. 86 Belfast Road), directly opposite the Lowtown Rath and Souterrain. The Stage 1 Preferred Corridor allowed for a potential off-line solution to avoid this constraint on the existing A8, between the rath and buildings. Following discussions with Northern Ireland Environment Agency: Built Heritage an online widening solution was developed which did not impact directly on the buildings and resulted in minimal impact on the rath. This off-line route was therefore not considered further.

8 Assessment and Appraisal Methodologies

The Stage 2 Scheme Assessment has been undertaken in accordance with the methodology set out in the DMRB, and the *New Approach to Appraisal (*NATA) and DfT's WebTAG guidance, which is the recommended basis for the appraisal of road schemes throughout the UK. WebTAG is an updated version of NATA and is also applicable to multi-modal transport schemes.

The process adopted for this Stage 2 assessment is based upon the DfT guidance 'Applying the Multi-Modal new Approach to Appraisal to Highway Schemes – TAG Unit1.3'. which states "*The DMRB assessment is an important initial step in this process as it provides the information required for a NATA appraisal and the supporting back up information and justification for the appraisal. For openness, clarity and consistency the New Approach To Appraisal requires the appraisal findings to be reported in an Appraisal Summary Table (AST).*" The key aspect to the new appraisal methodology is the difference between an 'assessment' and an 'appraisal'.

An 'assessment' is of an individual option undertaken in isolation to any other options and reported factually as such. An 'appraisal' is the act of directly comparing/ contrasting against the other options, facilitating and leading to a recommendation over a preference.

Therefore within this chapter the assessment and appraisal aspects of the scheme assessment process are kept separate, and the methodologies adopted are outlined separately below. The initial assessment of the options was undertaken in accordance with the DMRB and satisfies the requirements of this guidance. The second part is the appraisal aspect of the study and is a WebTAG-based study which uses the information gathered during the DMRB assessment, culminating in the production of Appraisal Summary Tables (ASTs) for all options which enables a direct comparison of the options.

8.1 DMRB Assessment Methodology

The assessment process is a DMRB-focussed study of the Stage 2 routes, in accordance with the methodologies set out in DMRB TD 37/93. This DMRB assessment process covers the following aspects:

- Engineering Assessment;
- Environmental Assessment;
- Cost Estimates;
- Traffic Assessment; and
- Economic Assessment.

The detailed methodologies adopted for this part of the Stage 2 Assessment are provided at the rear of this report in Appendix C.

8.2 WebTAG Appraisal Methodology

The appraisal of the routes has been undertaken in accordance with the NATA and the DfT's WebTAG guidance.

The WebTAG scheme appraisal has been informed by the DMRB assessment, as summarised in Table 8.1, and supplemented with additional information as required. This WebTAG appraisal has been undertaken using the five Government over-arching objectives for transport:

- Environment,
- Safety,
- Economy,

- Accessibility, and
- Integration.

In addition to these objectives WebTAG affords the opportunity to assess the proposals against 'supporting analysis', which centres around the issues of Affordability, Practicality and Public Consultation/Public Acceptability. These supplementary objectives are focussed to cater for those specific requirements of users and funders of the proposals, rather than the general public which is the focus of the five over-arching objectives. Supporting analyses are likely to be of interest to Central Government and the regional and local authorities, as well local people.

Table 8.1: Comparison between WebTAG Objectives and DMRB Assessment

WebTAG Objectives		**DMRB Assessment**
Environment	Noise	Environmental - Noise
	Local Air Quality	Environmental - Air Quality
	Greenhouse Gases	Environmental - Air Quality
	Landscape	Environmental - Landscape
	Townscape	Environmental - Landscape
	Biodiversity	Environmental – Nature Conservation
	Heritage/Historical Resources	Environmental – Cultural Heritage
	Water Environment	Environmental – Road Drainage and Water Environment
	Physical Fitness	Environmental – Effect on All Travellers
	Journey Ambience	Environmental - Effect on All Travellers
Safety	Accidents	Economic – Accident Benefits
	Security	-
Economy	Public Accounts	Cost Estimate and Economic Assessment
	Transport Economic Efficiency	Economic Assessment
	Reliability	Traffic Assessment
	Wider Economic Impacts	-
Accessibility	Option Values	-
	Severance	Environmental – Community and Private Assets, and the Traffic Assessment
	Access to the Transport System	-
Integration	Transport Interchange	-
	Land Use Policy	-
	Other Government Policies	-
Supporting Analysis	Affordability	Cost Estimate
	Practicality	Engineering – Construction Issues
	Public Acceptability	Public Consultation

The DMRB Engineering and Environmental Assessment have influenced the cost estimates and therefore the Private Assets element of the Environmental Assessment has influenced the WebTAG Economy Objective through the cost estimate. The detailed methodologies adopted for this part of Stage 2 Assessment are provided at the rear of this report in Appendix C.

For openness, clarity and consistency the WebTAG appraisal of each of the route options has been summarised and presented in an AST which provides a structured assessment framework for comparison between the options and judgement on the overall value-for-money of each of the options in achieving the Government's five objectives.

The balance of all this information for each of the route options has been used to recommend a 'Preferred Route' for this A8 dualling scheme, based on the project team's professional judgement. It takes into account all potential impacts, both monetised and non-monetised, and the qualitative as well as quantitative information. The corridor comparison and recommendation of the 'Preferred Route' is detailed in Chapters 12 and 13 of this report.

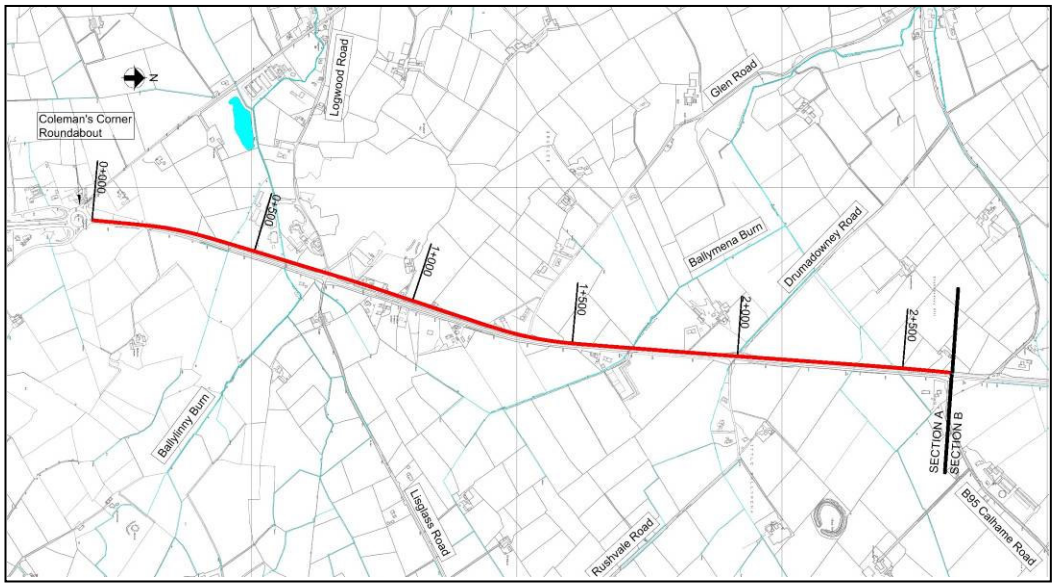
9 Section A - Assessment and Appraisal

Section A considers the route options available at the southern end of the scheme at the small settlement of Bruslee. The proximity of residential and commercial properties to the existing A8 in Bruslee represents a major constraint for an online option. Therefore the Stage 2 Assessment has considered both online and off-line routes options.

9.1 Route A1, Online Improvement Bruslee – DMRB Assessment

Route A1 is detailed in Section 7. In summary it would provide an online solution for Section A, and involve widening the existing carriageway to the west between Coleman's Corner roundabout and the B95 (Calhame Road) along the current Protected Route within BMAP.

Figure 9.1: Route A1 Plan



9.1.1 A1 Engineering Assessment

9.1.1.1 A1 Geometric Assessment

The Route A1 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard. The alignment of Route A1 has been developed to allow a continuous alignment through Coleman's Corner roundabout, to accommodate potential future upgrades of the roundabout to a grade separated junction.

Junction strategy was previously discussed in Section 5.5, which outlined that the existing roundabout at Coleman's Corner would be retained, with left-in left-out junctions provided for the remaining side roads within this section. The existing roundabout has been assessed and meets the requirements of TD 16/07 (full details of the assessment are presented in the Arup report entitled *'A8 Belfast to Larne Dual Carriageway, Coleman's Corner to Ballyrickard Road; Junction Strategy Report')*. The remaining left-in left-out junctions would be designed in accordance with the requirements of TD 42/95. There are no perceived geometric issues with any of the proposed junctions associated with Route A1.

The existing B95 Hillhead Road and Logwood Road junction has limited visibility. The delivery of Route A1 is likely to increase the volume of traffic using this junction and therefore the proposals include the upgrade of this junction to improve visibility. Logwood Road is derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed junction will require a Departure from standard, for a 100kph design speed, for the horizontal radii on the approach to Hillhead Road. It should however

be noted that the improvements will increase visibility, therefore improving the safety of the junction.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

9.1.1.2 A1 Structures

Route A1 would require one new structure:

- STW01 – Ballylinny Burn

The proposed level of the new dual carriageway would need to be lifted by approximately 0.75m above the existing road level, to provide sufficient level difference between the proposed road and existing watercourses for road drainage system. Therefore at this stage it is considered that it is unlikely to be possible to retain the existing bridge across the Ballylinny Burn (see Section 2.3). A replacement structure would geometrically be relatively simple with straight road and watercourse alignments.

The existing Ballylinny Burn Bridge is a single span concrete slab structure and therefore no issues have been identified associated with the demolition of this structure.

9.1.1.3 A1 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route A1 confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. However, to achieve adequate fall between the road level and the watercourse, some sections of the proposed dual carriageway would need to be raised above the existing road level. For the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

Cross drainage was modelled using the 1-in-100 year flows for the various catchments with an additional flow of 20% to account for climate change, and culvert sizes were calculated using these flows. For Route A1, there would be a total of four culverts with one bridge (refer to Section 9.1.1.2). It was found that most of the culverts would need to be single culverts 1500mm deep. The deepest culvert was for the Ballymena Burn which would be 2100mm deep.

9.1.1.4 A1 Utility Services

Route A1 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 9.1 below.

Table 9.1: Route A1 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of 33Kv overhead power lines crossing the A8 north of Drumadowney Road.	131,000
Northern Ireland Water	Diversion of watermains and sewers along the A8 between Logwood Road and Calhame Road.	238,260
BT	Diversion of overhead BT lines in the region of Drumadowney Road and underground cables along the A8 between Logwood Road and Calhame Road.	19,910
	Total Costs	**£389,170**

Route A1 would impact on the existing utilities which cross and run along the western verge of the A8. The main impact would be on overhead power lines which cross the scheme just north of Drumadowney Road and the watermain along the A8. The route would follow the existing A8 corridor, but would minimise the impact by widening to the west away from the main utilities in the eastern verge of the A8.

9.1.1.5 A1 Geotechnics

Route A1 would widen the existing road to the west, encompassing the existing road into the dual carriageway where possible. The ground conditions to the west of the A8 are generally superficial deposits; however, there are two small poorly drained areas along the western edge of the A8 which the route would cross. It may be necessary to dig out and replace some of the material in the poorly drained areas. Regardless, it is considered that there are no significant geotechnical issues associated with forming a foundation for the new dual carriageway.

There is a site of an old petrol filling station (buildings and petrol tanks still remain) located on the west of the A8 in Bruslee which would be crossed by this route. This is potentially a source of contaminated land, and it would be necessary to dig out and dispose of any contaminated land.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 9.1.2.5.

9.1.1.6 A1 Construction Issues

Route A1 is an on-line widening solution for Section A. Route A1 would retain this existing carriageway and widen it to the west, which may result in some disruption to the existing A8 traffic during construction. The widening works are likely to require a temporary speed limit of 40mph on the A8 during the works, although it is envisaged both lanes of traffic could be maintained for the majority of the work. The construction of Route A1 may however require the temporary closure of some of the existing side roads during the construction period.

The construction of Route A1 would require the import of a relatively small amount of fill material which could be obtained from other sections of the scheme or from borrow pits adjacent to the site.

The replacement of the existing structure across the Ballylinny Burn (STW01) would have to be constructed in two phases to maintain traffic flows along the A8. The first phase would be to construct one half of the structure while traffic uses the existing bridge, before switching traffic across and demolishing the old structure and constructing the second half of the new structure. Although this will make the construction sequence more complex, it is not considered a significant issue.

9.1.2 A1 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

9.1.2.1 A1 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route A1 are well below the air quality objectives. However, the assessment against the do-minimum scenario showed total NO_2 emissions would increase by 23% in both 2016 and 2031, and the PM_{10} emissions by 60% and 68% in 2016 and 2031 respectively.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from negligible to slight adverse.

However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

9.1.2.2 A1 Cultural Heritage

There is one known recorded site within the immediate vicinity of Route A1. This is a cropmark (shape or marking in crops because of differential growth), which was identified from an aerial photograph. However, subsequent site visits by NIEA: Built Heritage found no visible remains on the ground. The position of the cropmark lies directly adjacent to the proposed dualling and could be impacted upon by associated ground works.

Additionally, this route runs along the edge of fields which may have already been disturbed by the construction of the existing A8 and building developments in the area. These could have affected any sub-surface unknown archaeological remains, should they exist, potentially reducing the quality of the remains.

The assessment of Route A1, based on the possible impact on a known site and the potential of encountering unknown remaining, is that it would have a *Slight Adverse* impact upon Cultural Heritage.

9.1.2.3 A1 Landscape

This route lies wholly within the Tardee and Six Mile Water Slopes (LCA). This area comprises predominately undulating land on low lying slopes. Increasing the road width to the west would result in the demolition of five residential properties and a Community Hall. The result would be a slight adverse effect on the settlement layout and cultural activity and a moderate adverse effect on human interaction as a facet of townscape. This option would also impact on the immediate existing landscape amenity of the road corridor and would necessitate the removal of some semi-mature hedgerows and trees alongside the road corridor.

The sensitivity of the wider landscape can be considered low to medium sensitivity. This, combined with the scale of the likely effects of the carriageway dualling, suggest that the area has a reasonable capacity to accommodate the proposed widening. The assessment suggests that this route would have a *Slight Adverse* effect on Landscape.

The area is not heavily settled but there are properties with short/medium distant views of the existing road corridor. The site survey revealed that in the majority of cases (except those adjoining the existing road corridor), views are filtered by existing roadside hedgerows and trees. If this planting was removed in the short term this might leave exposed views to and from the widened road. This route would have a *Slight Adverse* visual effect.

9.1.2.4 A1 Nature Conservation

There are no statutory or non-statutory designated sites within, or adjacent to this route. The principal habitats affected include field boundaries such as hedgerows, areas of improved grasslands, scattered tress and scrub and four small areas of marshy grassland. The largest of these is considered to be floodplain grazing marshland, which is a Northern Ireland Biodiversity Action Plan (BAP) habitat. This type of habitat is usually considered to be of importance for breeding and wintering birds, and for invertebrates. However, the small area would suggest that the importance of these habitat patches to such species is likely to be limited.

The surrounding area and features are considered suitable to support a number of protected species; otters, bats, badgers, and protected birds and fish. However, following site visits and data received from Centre for Environmental Data and Recording (CEDaR) the only evidence of any of these protected species is the presence of salmonids, principally brown trout, in the Ballylinny Burn.

Even though not recorded or located the possible presence of badgers, otters and birds, in addition to the known salmonid species along the route could result in an adverse impact on

these species. However, appropriate mitigation may adequately address these issues. Overall Route A1 will have a *Slight Adverse* effect.

9.1.2.5 A1 Materials

The alignment of Route A1 crosses superficial deposits, but none of the cut earthworks are deep enough to intersect the basalt bedrock. Some made ground may be present along the route associated with the construction of the existing A8, and there are several minor watercourses, springs and risings in the vicinity. Groundwater may also be close to the surface in places. Route A1 would encompass the site of an old petrol station within Bruslee and there is the potential for contaminated material associated with the petrol tanks. However it is not anticipated there will be any further contaminated material within the made ground along this route, or for this route to have any impact on the Bruslee landfill site.

The proposed route will require a relatively small amount of fill material during the ground works, and will reuse and incorporate the existing road. Therefore the overall affect on geology and materials is considered to be *Slight Adverse*.

9.1.2.6 A1 Noise

In terms of overall noise impact with Route A1 there is little change to the remaining properties in the centre of Bruslee, although properties along Camtall Road would be subject to a minor adverse impact. The increased flows on the A8 would lead to dwellings along the alignment becoming subject to a moderate adverse impact. Table 9.2 provides the results of the noise assessment for Route A1 in 2031.

Table 9.2: Route A1 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	36	36	0	0
0.1 – 0.9	889	63	7	1
1 – 2.9	93	3	0	0
3 – 4.9	9	0	0	0
5+	1	0	0	0
Total	**992**	**66**	**7**	**1**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

9.1.2.7 A1 Effects on all Travellers

The overall scheme proposals would improve the existing facilities for pedestrians and cyclists, affording safe provision along the carriageway between facilities. However, the introduction of a dual carriageway through the settlement would increase the amount of traffic, which would be travelling at high speed, and provide a greater obstacle for pedestrians and cyclists in terms of crossing and accessing facilities.

Route A1 would provide an important route for vehicle travellers, with a dual carriageway providing more free flowing conditions. Improvements in travelling times and the inclusion of a permanent, safe overtaking opportunity would lead to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Neutral*, based on the benefits for vehicle travellers and greater obstacle provided for pedestrians and cyclists.

9.1.2.8 A1 Community and Private Assets

As with all the options being considered, Route A1 would improve the existing main road corridor and contribute to an overall improvement on the local road network and connectivity with wider community facilities. However, this route would widen the existing alignment, resulting in the loss of one of the community facilities within Bruslee, and affect the access to other facilities. The widening would also increase the severance between facilities and dwellings on either side of the road. The effect on Community Assets would be *Large Adverse.*

This route would require the demolition of five residential properties and a Community Hall within Bruslee, reducing the existing population of the settlement significantly. Six further residential properties would be impacted through some loss of gardens. In addition approximately 40 hectares of Grade 3b agricultural land would be lost to the scheme. Two farm businesses have been identified which would endure slight adverse impacts on the management, performance and future viability. Six further agricultural units were identified where the land is currently rented out. The overall effect of Route A1 on Private Assets would be *Large Adverse*.

9.1.2.9 A1 Road Drainage and the Water Environment

Route A1 crosses five watercourses including the Ballylinny Burn, Ballymena Burn and three other tributaries. This route would require the enlargement, replacement and/or extension of the culverts and structures carrying the existing A8 over these watercourses. The principle impacts on these watercourses will be the potential for increased velocity and volume of road runoff, and the increased risk of pollution from road runoff during construction and operation.

Groundwater is known to lie close to the surface at various locations adjacent to the existing A8. Potential impacts to this resource may include alterations to natural drainage patterns due to the introduction of new road infrastructure. In addition, this route crosses some 270m of floodplain which would impact upon the extent of the flood storage capacity within this section of the watercourse catchment.

The key impact for this route is the potential impact to flooding and loss of flood storage. The impact on the water environment has been assessed to be *Slight Adverse*.

9.1.3 A1 Cost Estimate

The Stage 2 cost estimate for Route A1 is presented in Table 9.3, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 9.3: Route A1 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**9,287,867**
Contractors Overheads & Profit (10%)	£	928,787
Sub Total	**£**	**10,216,653**
Land Costs and Compensation	£	2,342,000
Preparation, surveys, design (9%)	£	919,499
Supervision (5%)	£	510,833
Contingency/Risk Allowance	£	499,525
Sub Total	**£**	**14,488,510**
Optimism Bias *(20% construction, 5% land and compensation)*	£	2,546,402
TOTAL ESTIMATED COST	**£**	**17,034,912**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total estimate cost of **£17,034,912.**

9.1.4 A1 Traffic Assessment

The central growth traffic forecasts for Route A1 for the design year, 2031, were developed for each of the different routes around Ballynure (Section B). The forecast traffic volumes vary depending on the choice of route around Ballynure, and therefore a range of traffic flows have been presented in Table 9.4 below.

Table 9.4: Route A1 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Direction	Annual Average Daily Traffic (AADT)	Total 2-way AADT
A8 (Coleman's Corner to B95 Green Road)	Northbound	8,757 – 9,044	17,562 – 17,850
	Southbound	8,388 – 8,806	
B95 Hillhead Road	Eastbound	5,204 – 5,879	11,112 – 11,267
	Westbound	5,284 – 5,912	

9.1.5 A1 Economic Assessment

The forecast traffic flows for all routes in Section A are the same (as outlined in Section 5.3 and Section 9.1.4), and therefore the benefits of the scheme for the route options in this section will be the same. Therefore a full economic assessment of the Section A routes has not been undertaken, because the only difference in the performance of individual routes will be the difference in capital costs. As outlined in Section 9.1.4, the total cost estimate for Route A1 is **£17,034,912.**

A full economic assessment of the whole scheme, Sections A, B and C, has been undertaken and is reported in Chapter 12.

9.2 Route A1, Online Improvement Bruslee - WebTAG Appraisal

9.2.1 A1 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 9.1.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the Appraisal Summary Table (AST) in Section 9.2.7.

9.2.2 A1 Safety Objective

9.2.2.1 A1 Accidents Sub-Objective

The quantitative accident benefits are determined using the forecast traffic flows and the proposed road layout. The forecast traffic flows for all routes in Section A are the same (as outlined in Section 5.3 and Section 9.1.4) and the proposed road layouts are similar. Therefore a full quantitative accident assessment of the Section A routes has not been undertaken, although a qualitative assessment has been provided below to assist in the comparison of routes.

A full quantitative accident assessment of the whole scheme, incorporating the preferred routes for Sections A, B and C, has been undertaken and is reported in Chapter 12.

Accidents/Safety During Operation

Initial comments from a Roads Safety Auditor were obtained on Route A1 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Five left-in left-out junctions are proposed for: Lisglass Road, Logwood Road, Glen Road, Drumadowney Road and Rushvale Road. Route A1 would also include two

left-in left-out accesses serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.

- There will be appreciable lengths of parallel two-way access roads running on both sides of the new dual carriageway and care will be needed (provision of anti-dazzle fencing) to ensure there is no dazzle problem between opposing traffic whose lights will be dipped to the left.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction, Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during the works. The major activities identified are:

- Demolition of six buildings;
- Demolition of the existing Ballylinny Burn bridge;
- Phased construction of one new structure (Ballylinny Burn Bridge);
- Removal of old petrol tanks within Bruslee;
- Construction work alongside existing utilities; and
- Traffic Management associated with online widening over approximately 2.6km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route A1 involves the construction/replacement of one new structure and four culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

9.2.2.2 A1 Security Sub-Objective

Route A1 would provide improved footways and pedestrian facilities along the route, and replacement street lighting through Bruslee. However, based on the guidance in WebTAG Unit 3.4.2 and the very low number of people using the facilities, the qualitative assessment score for this sub-objective would be *Neutral.*

9.2.3 A1 Economy Objective

As outlined in Section 9.1.5 a full economic assessment of the different Section A routes has not been undertaken because the forecast traffic flows are the same and therefore the benefits will be the same. Therefore only the capital cost estimate for the scheme is presented in the Route A1 AST in Section 9.2.7. A full economic assessment of the complete scheme, incorporating the preferred routes for Sections A, B and C has been undertaken and is reported in Chapter 12.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route A1 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

9.2.4 A1 Accessibility Objective

9.2.4.1 Option Values Sub-Objective

The public transport provision on Route A1 would be similar to the existing, with existing bus stops in Bruslee retained. The qualitative assessment of Route A1 on Option Values would be *Neutral* based on no changes to the availability of transport services.

9.2.4.2 A1 Severance Sub-Objective

The key area for pedestrians and cyclists within Section A is Bruslee. The existing A8 represents an obstacle between residential properties and community facilities within Bruslee (see Section 9.1.2.8).

The widening of the scheme would increase the severance between facilities on either side of the dual carriageway, and is likely to dissuade some people from crossing the A8. The number of non-motorised user journeys within Bruslee is low and therefore the impact on the severance sub-objective would be *Slight Negative*.

9.2.4.3 A1 Access to the Transport System Sub-Objective

The public transport provision on Route A1 will be similar to the existing, with existing bus stops in Bruslee retained. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low and therefore the qualitative assessment of this sub-objective would be *Neutral* for Route A1.

9.2.5 A1 Integration Objective

9.2.5.1 A1 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section A are the existing bus stops along the A8. The proposed scheme would provide similar facilities along the new dual carriageway. However, the passenger numbers for these bus stops are very low and therefore the impact on this sub-objective would be *Neutral.*

9.2.5.2 A1 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 1 General Principles. Further design development will be required to mitigate or minimise impacts.

9.2.5.3 A1 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route A1 would be *Beneficial.*

9.2.6 A1 Supporting Analysis

9.2.6.1 A1 Affordability

The Route A1 scheme costs is reported in Section 9.1.3 with a total cost estimate of £**17,034,912** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

9.2.6.2 A1 Practicality

The Practicality of Route A1 is reported in the Section 9.1.1.6 of the engineering assessment.

9.2.6.3 A1 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is public support for the A8 improvements, however in relation to the route of the dual carriageway at Bruslee there was no clear public preference on whether it should be an online, equivalent to Route A1, or off-line solution.

9.2.7 A1 Appraisal Summary Table

The appraisal for Route A1 is summarised and presented in an AST, overleaf.

Table 9.5: Route A1 Appraisal Summary Table

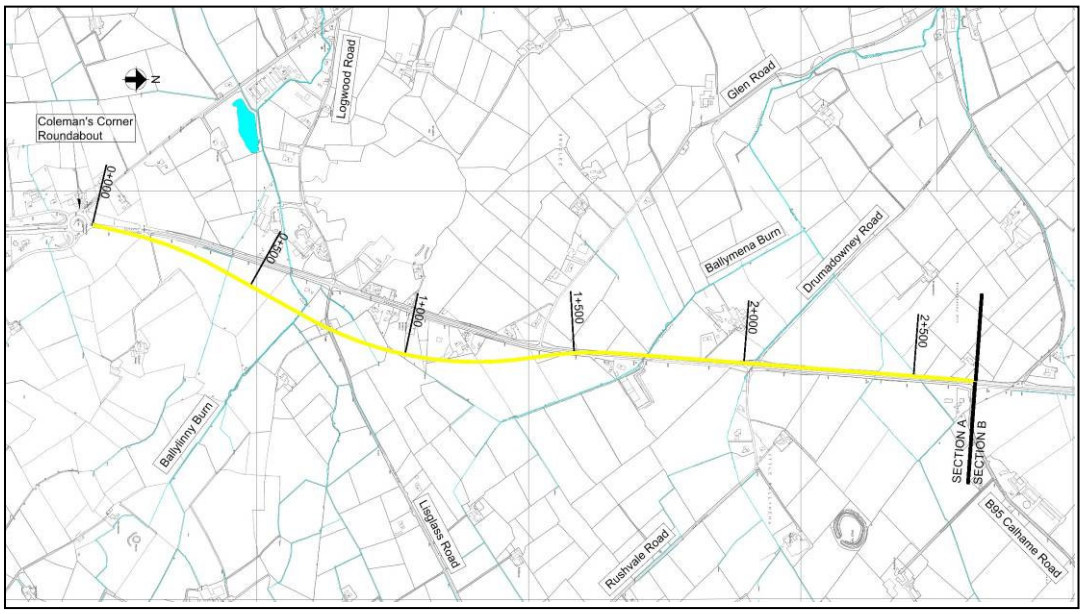
Route A1, Online Improvement through Bruslee		,	**Problems:** Demolition of 5 properties and 1 community facility, severance within Bruslee and impact on pedestrians and cyclists within Bruslee.	**Total cost estimate:** £17,034,912
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	Estimated Population Annoyed (Without Scheme): 156 Estimated Population Annoyed (With Scheme): 157		Net Noise Annoyance: 1
	Local Air Quality	There are a total of 109 properties within 200m of the proposed Option A1 route corridor. In 2016, 80 properties are predicted to experience deterioration in PM_{10} and NO_2 and 29 properties in 2031 when compared to the do-minimum.	The net change for NO_2 would be -105 for 2031, with -116 for PM_{10} and -105 for $PM_{2.5}$.	109 properties within 200m
	Greenhouse Gases	Slight increase in greenhouse gases		Slight Adverse
	Landscape	Local impacts primarily from loss of boundary features, including hedgerows, trees and residential properties and the filtering effect these provide on the existing A8 to wider views.		Slight Adverse
	Townscape	Impact on the settlement of Bruslee through demolition of residential properties and greater visual impact from the widened road.		Moderate Adverse
	Heritage/ Historic Resources	This area has largely been disturbed by previous road construction. There is one archaeological site, a cropmark, is located immediately adjacent to the route. However the route should not directly impact upon this cropmark. There is the possibility that unrecorded sub-surface archaeological features could remain and associated groundworks have the potential to impact negatively on any such features.		Slight Adverse
	Biodiversity	There will be minor impacts to five small watercourses through extended/replacement crossings or culverts, causing localised loss of habitat and disturbance to species. Loss of field boundaries and low quality marshy grassland may also occur. In addition, the possible presence of badgers, birds and salmonid species along the route could result in adverse impacts on these species, of most significance are potential adverse impacts to otter and bats.		Slight Adverse
	Water Environment	This route will require the enlargement, replacement and/or extension of the culverts and structures carrying the existing A8 over five small watercourses including the Ballylinny Burn, Ballymena Burn and 3 other tributaries to Six Mile Water. This route crosses some 270m of floodplain which would have an impact upon the extent of flood storage capacity within this section of the watercourses' catchment.		Slight Adverse
	Physical Fitness	Severance created by the existing and proposed carriageway would remain. Formal provision for pedestrians and cyclists would be improved.		Neutral
	Journey Ambience	There would be a net improvement in Journey Ambience with respect to care and stress through a reduction in travel times along the A8, and alleviation of traffic congestion, particularly during peak times. All these factors would contribute to an enhanced driving experience along this section of the A8.		Slight Benefit
Safety	Accidents	Improvement on existing single carriageway. 5 no. left-in left-out junctions, two left-in left-out access, lengths of parallel access roads were identified by a Road Safety Auditor as potential		Slight Benefit

		safety hazards.		
	Security	Route A1 would provide improved footways and pedestrian facilities along the route, and replacement street lighting through Bruslee. However, the number of people using is low.		Neutral
Economy	Public Accounts		2009 Q1 cost estimate £17,034,912	Total cost estimate £17,034,912
	Transport Economic Efficiency: Business Users			Not Assessed
	Transport Economic Efficiency: Consumer Users			Not Assessed
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops in Bruslee retained.		Neutral
	Severance	The widening of the A8 would increase the severance between facilities on either side of the dual carriageway and is likely to dissuade some people from crossing the A8, although the number of pedestrian and cyclist journeys is low.		Slight Negative
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little/no benefit because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 1.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

9.3 Route A2, Inner Eastern Bypass of Bruslee – DMRB Assessment

Route A2 is detailed in Section 7. In summary it would provide an inner bypass of Bruslee leaving the existing alignment after Coleman's Corner roundabout and rejoining the existing road just north of the Glen Road Junction, with the remainder of the route online widening to the west of the existing carriageway.

Figure 9.2: Route A2 Plan



9.3.1 A2 Engineering Assessment

9.3.1.1 A2 Geometric Assessment

The Route A2 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard. Route A2 has also been developed to provide a continuous alignment through the Coleman's Corner junction to accommodate potential future upgrades of the junction to a grade separated junction.

The junction strategy would be predominately the same as Route A1 and was previously discussed in Section 5.5, which outlined that the existing roundabout at Coleman's Corner would be retained with left-in left-out junctions provided for the remaining side roads. There are no perceived geometric issues with any of the proposed junctions associated with Route A2.

The section of the existing A8 through Bruslee will be retained to provide local access to properties and businesses in Bruslee. The old A8 will be connected to the B95 Hillhead Road at the southern end of the bypass (to the west of the Coleman's Corner Roundabout) and form a left-in left-out junction with the new dual carriageway. The existing A8 through Bruslee will be subject to the national speed limit of 60mph. The layout of the proposed junction at the northern end of the bypass will require a Departure from standard for the horizontal radii.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

9.3.1.2 A2 Structures

Route A2 would require one new structure:

- STW01 – Ballylinny Burn

STW01 would geometrically be relatively simple with straight road and watercourse alignments. The structure form would be the same as the proposed structure for Route A1, however the construction of the bridge would be off-line allowing space for construction and removing the requirement for phased construction and traffic management.

The existing A8 would be retained and therefore the existing Ballylinny Burn Bridge would not be affected by Route A2.

9.3.1.3 A2 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route A2 confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route and would be similar to the drainage requirements of Route A1. For the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

The watercourses crossed by the route are the same as Route A1 and therefore would require the same number of culverts (four) and a new structure across the Ballylinny Burn bridge (refer to Section 9.3.1.2).

9.3.1.4 A2 Utility Services

Route A2 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 9.6 below.

Table 9.6: Route A2 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Drumadowney Road.	131,000
Northern Ireland Water	A diversion of watermains, along side the existing A8, as Route A2 leaves the existing A8 just north of Coleman's Corner.	25,760
BT	Diversion of overhead BT lines in the region of Drumadowney Road and underground cables along the A8 as the bypass rejoins the existing A8.	9,060
	Total Costs	**£165,820**

Route A2 would impact on the existing utilities which run along the eastern verge when it leaves and rejoins the existing A8. It would also impact on those which cross the proposed route. The main impact would be on the overhead power lines which cross the scheme just north of Drumadowney Road, the same as Route A1.

9.3.1.5 A2 Geotechnics

This route would have similar geotechnical issues as Route A1. The ground conditions are generally superficial deposits, however there a couple of small poorly drained areas along the western edge of the A8, where Route A1 and A2 are the same. It may be necessary to dig out and replace some of the material in the poorly drained areas. The route will differ from Route A1 by creating a slight cutting during the off-line section; however this cutting will not be deep enough to intersect the basalt bedrock. There are no significant geotechnical issues associated with forming a foundation for the new dual carriageway.

There is not anticipated to be any contaminated material along Route A2.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 9.3.2.5.

9.3.1.6 A2 Construction Issues

Route A2 is a part bypass and part on-line widening solution for Section A. Route A2 would provide an off-line bypass around Bruslee and then an online solution between Glen Road and Calhame Road. The off-line sections can be constructed with minimal disruption to the existing A8 traffic. The widening works however, are likely to require a temporary speed limit of 40mph on the A8 during the works, although it is envisage both lanes of traffic could be maintained for the majority of the work. In a similar manner to Route A1, the construction of this route may require the temporary closure of the some of the existing side roads during the construction period.

The construction of Route A2 would require the import of a relatively small amount of fill material which could be obtained from other sections of the scheme or from borrow pits adjacent to the site.

The construction of the one new structure across the Ballylinny Burn (STW01) will be off-line and therefore can be constructed without any phasing or traffic management requirements.

9.3.2 A2 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

9.3.2.1 A2 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route A2 are well below the air quality objectives. However, the assessment against the do-minimum scenario showed total NO_2 emissions would increase by 23% in both 2016 and 2031, and the PM_{10} emissions by 60% and 68% in 2016 and 2031 respectively, the same as Route A1.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

9.3.2.2 A2 Cultural Heritage

There are six known recorded sites within the immediate vicinity of Route A2, however none of them lie within the path of the proposed route. It is therefore not anticipated that there will be any impacts to these sites.

Given the length of the off-line section of the route, it is likely there are other, unknown archaeological sites within the route footprint, especially within greenfield areas. Therefore there is a good probability that works associated with this route would impact on previously unidentified deposits of archaeological potential.

Although this route will not impact upon known recorded sites, the amount of development through greenfield land may result in a *Slight Adverse* impact upon unknown archaeology.

9.3.2.3 A2 Landscape

This route lies wholly within the Tardee and Six Mile Water Slopes LCA. This area is predominately undulating land on low lying slopes. Route A2 would arc across the flat, low lying pastureland in a gentle sweep causing some severance of the existing field pattern. This route would also directly affect a Tree Preservation Order for a group of trees to the east of Bruslee. The alignment introduces a new road into what is currently an undisturbed area of Tardee and Six Mile Water Slopes LCA, only a short distance from the current corridor, and at both the divergence and tie-in of the new road corridor there would be negative but localised impact from the overall broadening of the overall corridor. Without

mitigation this route would be more visually prominent in the immediate locality than Route A1.

The wider landscape can be considered low to medium sensitivity. This combined with the scale of the likely effects of the new dual carriageway suggest that the area has a reasonable capacity to accommodate the proposed widening. The assessment suggests that this route would have a *Moderate Adverse* effect. However, this should be tempered with a slight beneficial effect on the townscape of Bruslee.

The area is not heavily settled but there are properties with short/medium distant views of the existing road corridor. The site survey revealed that in the majority of cases (except those adjoining the existing road corridor), views are filtered by existing roadside hedgerows and trees. The alignment roughly follows the grain of the landscape which assists in minimising wider visual effect. This route would have a *Moderate Adverse* visual effect.

9.3.2.4 A2 Nature Conservation

The impact of Route A2 on designated sites and habitats is similar to Route A1. There are no statutory or non-statutory designated sites within or adjacent to the route, and the principal habitats affected include field boundaries such as hedgerows, areas of improved grasslands, scattered tress and scrub and four small areas of marshy grassland.

The surrounding area and features are considered suitable to support a number of protected species; otters, bats, badgers, and protected birds and fish and the impact on them will be similar to Route A1.

The principle impact from this route would be greater areas of habitat loss, new structures required at river crossings and hedgerow loss where there is not existing impact from traffic. The possible presence of badgers, birds and salmonid species along the route could result in adverse impact on these species, of most significance are potential adverse impacts to bats and otters. Overall Route A2 will have a *Moderate Adverse* effect.

9.3.2.5 A2 Materials

Route A2 will have a similar impact on geology and materials as Route A1. Although it will require slightly more fill material than Route A1 the volumes are still relatively small. The key difference between Route A2 and A1 is that approximately half of the route is off-line therefore requiring a completely new road and providing no opportunity to incorporate the existing infrastructure. Therefore the overall affect on geology and materials is considered to be *Slight Adverse.*

9.3.2.6 A2 Noise

In terms of overall Noise impact with Route A2 the rear facades of dwellings along the eastern side of the existing A8 may be subject to a major adverse impact, with dwellings further to the east subject to a minor or moderate impact. Some properties to the western side of the existing A8 may be subject to a moderate beneficial impact. Table 9.7 provides the results of the noise assessment for Route A2 in 2031.

Table 9.7: Route A2 Noise Assessment

Change in noise level (dB)	*Dwellings subject to change in noise level*		*Number of other sensitive receptors subject to a change in noise level*	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	31	31	1	1
0.1 – 0.9	865	55	5	0
1 – 2.9	106	3	2	0
3 – 4.9	23	3	0	1
5+	9	4	0	0
Total	**1003**	**65**	**7**	**1**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

9.3.2.7 A2 Effects on all Travellers

The overall scheme proposals would improve the existing facilities for pedestrians and cyclists, affording safe provision along the carriageway between facilities. Route A2 removes the A8 traffic from Bruslee therefore providing the opportunity to introduce better facilities for pedestrians and cyclists within the settlement. The removal of the A8 from Bruslee removes the obstacle present with Route A1.

The impact for vehicle travellers will be the same as Route A1, with a dual carriageway providing travel under more free flowing conditions.

The overall effect on All Travellers for this route would be *Moderate Beneficial***,** based on the benefits for vehicle travellers, pedestrians and cyclists.

9.3.2.8 A2 Community and Private Assets

As with all the options being considered, Route A2 would improve the existing main road corridor and contribute to an overall improvement on the local road network and connectivity with wider community facilities. However, this route removes the existing A8 from Bruslee and has no impact on the community facilities within the settlement. The existing A8 would remain to serve local properties, and less traffic along this section of the road would make access to the community facilities safer and improve the amenity of the settlement. The effects of this route on Community Assets would be *Slight Beneficial***.**

This route would require the demolition of one residential property (currently under construction). Four further residential properties would be impacted through some loss of gardens. In addition, approximately 77 hectares of Grade 3b agricultural land would be lost to the scheme. Two farm businesses have been identified one would endure a slight adverse impact and the other a moderate adverse impact on the management, performance and future viability. Six further agricultural units were identified where the land is currently rented out. The overall effect of Route A2 on Private Assets would be *Slight Adverse.*

9.3.2.9 A2 Road Drainage and the Water Environment

The impacts of the route on the water environment are similar to Route A1. The route crosses the same watercourses, although will require two new watercourse crossings on the off-line section, including a new structure over the Ballylinny Burn. Route A2 will also cross approximately 300m of floodplain.

The key impact for this route is the potential impact to flooding and loss of flood storage. The impact on the water environment has been assessed to be *Slight Adverse*.

9.3.3 A2 Cost Estimate

The Stage 2 cost estimate for Route A2 is presented in Table 9.8, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 9.8: Route A2 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**9,360,374**
Contractors Overheads & Profit (10%)	£	936,037
Sub Total	**£**	**10,296,412**
Land Costs and Compensation	£	1,046,500
Preparation, surveys, design (9%)	£	926,677
Supervision (5%)	£	514,821
Contingency/Risk Allowance	£	875,180
Sub Total	**£**	**13,659,589**
Optimism Bias *(20% construction, 5% land and compensation)*	£	2,574,943
TOTAL ESTIMATED COST	**£**	**16,234,532**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£16,234,532**.

9.3.4 A2 Traffic Assessment

The central growth traffic forecast for Route A2 for the design year, 2031, are the same as Route A1 and were developed for each of the different routes around Ballynure. The forecast traffic volumes vary depending on the choice of route around Ballynure, and therefore a range of traffic flows have been presented in Table 9.9 below.

Table 9.9: Route A2 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Direction	Annual Average Daily Traffic (AADT)	Total 2-way AADT
A8 (Coleman's Corner to B95 Green Road)	Northbound	8,757 – 9,044	17,562 – 17,850
	Southbound	8,388 – 8,806	
B95 Hillhead Road	Eastbound	5,204 – 5,879	11,112 – 11,267
	Westbound	5,284 – 5,912	

The old section of the A8 through Bruslee will cater for local traffic to residential properties and businesses. The forecast traffic flows will be low and are therefore not reported in the table.

9.3.5 Economic Assessment

The forecast traffic flows for all routes in Section A are the same (as outlined in Section 5.3 and Section 9.3.4), and therefore the benefits of the scheme for the route options in this section will be the same. Therefore a full economic assessment of the Section A routes has not been undertaken, because the only difference in the performance of individual routes will be the difference in capital costs. As outlined in Section 9.3.4, the total cost estimate for Route A2 is **£16,234,532.**

9.4 Route A2, Inner Eastern Bypass of Bruslee - WebTAG Appraisal

9.4.1 A2 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 9.3.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separated report entitled

'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'. Details of the environmental objective appraisal are provided in the AST in Section 9.4.7.

9.4.2 A2 Safety Objective

9.4.2.1 A2 Accidents Sub-Objective

The quantitative accident benefits are determined using the forecast traffic flows and the proposed road layout. The forecast traffic flows for all routes in Section A are the same (as outlined in Section 5.3 and Section 9.3.4) and the proposed road layouts are very similar. Therefore a full quantitative accident assessment of the Section A routes has not been undertaken, although a qualitative assessment has been provided below to assist in the comparison of routes.

A full quantitative accident assessment of the whole scheme, incorporating the preferred routes for Sections A, B and C, has been undertaken and is reported in Chapter 12.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route A2 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Four left-in/left-out junctions are proposed for: Lisglass Road, Logwood Road, Drumadowney Road and Rushvale Road. Route A2 would also include two left-in left-out accesses serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- There are potential differences in traffic flows at the junction of Logwood Road with the B95 Hillhead Road, and the new proposed connection at the southern end of the severed A8. These junctions will need detailed consideration to ensure no deterioration in safety.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction, Design and Management (CDM) Regulations 2007 the risk associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during the works. The major activities identified are:

- Demolition of one building (under construction at time of writing this report);
- Construction of one new structure (Ballylinny Burn bridge);
- Limited construction work alongside existing utilities; and
- Traffic Management associated with online widening over approximately 1.2km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route A2 involves the construction/replacement of one new structure and four culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

9.4.2.2 A2 Security Sub-Objective

Route A2 would provide improved footways and pedestrian facilities along the route in a similar manner to Route A1. However, based on the guidance in WebTAG Unit 3.4.2 and the very low number of people using the facilities, the qualitative assessment score for this sub-objective would be *Neutral.*

9.4.3 A2 Economy Objective

As outlined in Section 9.3.5 a full economic assessment of the different Section A routes has not been undertaken because the forecast traffic flows are the same and therefore the benefits will be the same. Therefore only the capital cost estimate for the scheme is presented in the Route A2 AST in Section 9.4.7. A full economic assessment of the complete scheme, incorporating the preferred routes for Sections A, B and C has been undertaken and is reported in Chapter 12.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route A2 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

9.4.4 A2 Accessibility Objective

9.4.4.1 A2 Option Values Sub-Objective

The public transport provision on this route will be similar to the existing and Route A1, with bus stops provided along the new dual carriageway. The qualitative assessment of the route on Option Values would be *Neutral,* the same as Route A1.

9.4.4.2 A2 Severance Sub-Objective

The key area for pedestrians and cyclists within Section A is Bruslee. The existing A8 represents an obstacle between residential properties and community facilities within Bruslee (see Section 9.3.2.8). The bypassing of the settlement would reduce the severance between facilities on either side of the existing A8. The number of non-motorised user journeys within Bruslee is low and therefore the impact on the severance sub-objective would be *Slight Positive*.

9.4.4.3 A2 Access to the Transport System Sub-Objective

The public transport provision on Route A2 will be similar to the existing, with bus stops provided along the new dual carriageway. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low therefore the qualitative assessment of this sub-objective would be *Neutral* for Route A2.

9.4.5 A2 Integration Objective

9.4.5.1 A2 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section A are the existing bus stops along the A8. The proposed scheme would provide similar facilities along the new dual carriageway. However, the passenger numbers for these bus stops are very low and therefore the impact on this sub-objective would be *Neutral.*

9.4.5.2 A2 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation. Further design development will be required to mitigate or minimise impacts

9.4.5.3 A2 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman’s Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route A2, would be *Beneficial*, the same as Route A1.

9.4.6 A2 Supporting Analysis

9.4.6.1 A2 Affordability

The Route A2 scheme costs is reported in Section 9.3.3 with a total cost estimate of **£16,234,532** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

9.4.6.2 A2 Practicality

The Practicality of Route A2 is reported in the Section 9.3.1.6 of the engineering assessment.

9.4.6.3 A2 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is public support and acceptability for the A8 improvements, however in relation to the route of the dual carriageway at Bruslee there was no clear public preference on whether it should be an off-line, equivalent to Route A2, or online solution.

9.4.7 A2 Appraisal Summary Table

The appraisal for Route A2 is summarised and presented in an AST, overleaf.

Table 9.10: Route A2 Appraisal Summary Table

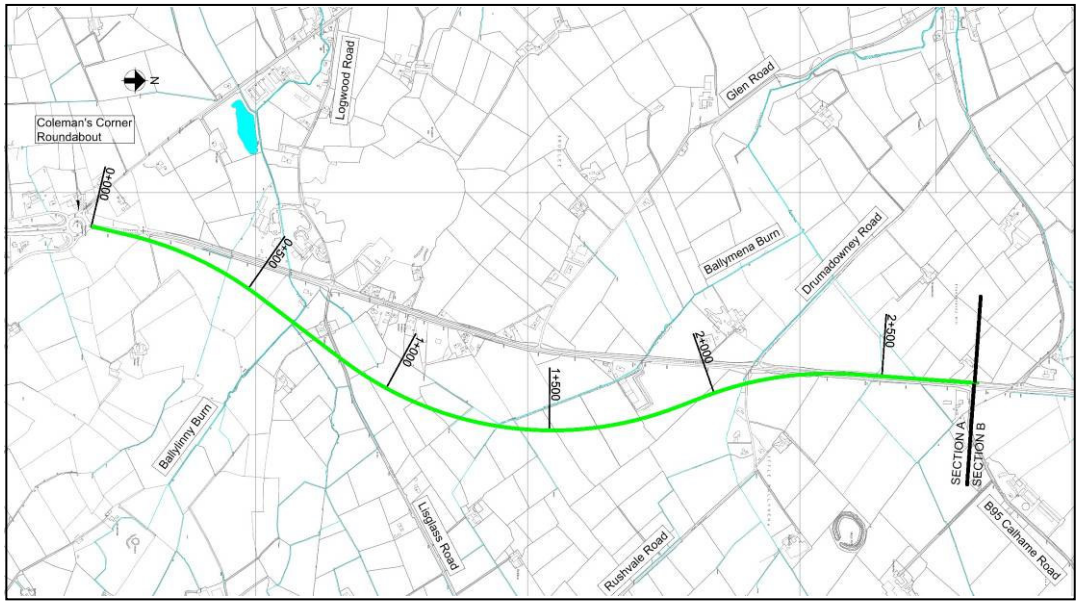
Route A2, Inner Eastern Bypass of Bruslee		,		**Problems:** Loss of a proposed dwelling site, loss of agricultural land and impact on landscape and biodiversity.	**Total cost estimate:** £16,234,532
Objective	***Sub-Objective***	***Qualitative Impacts***		***Quantitative Assessment***	***Assessment***
Environment	Noise		Estimated Population Annoyed (Without Scheme): 158 Estimated Population Annoyed (With Scheme): 163		Net Noise Annoyance: 5
	Local Air Quality	There are a total of 100 properties within 200m of the proposed Option A1 route corridor. In 2016, 50 and 80 properties are predicted to experience deterioration in PM_{10} and NO_2 respectively. In 2016, 59 properties are predicted to experience an improvement in NO_2 concentrations when compared to the do-minimum, together with 29 properties for PM_{10}.		The net change for NO_2 would be -105 for 2031, with -116 for PM_{10} and -105 for $PM_{2.5}$.	100 properties within 200m
	Greenhouse Gases	Slight increase in greenhouse gases			Slight Adverse
	Landscape	On-line the local impacts are primarily loss of boundary features including hedgerows and trees and property and the filtering effect these provide on the existing A8 to wider views. The offline section would sever and sub-divide existing field patterns, but would follow the grain of the landscape.			Moderate Adverse
	Townscape	There is likely to be limited potential visual impact on existing housing located on the eastern periphery of Bruslee. There is also the potential for proposed bridge structures and the new road alignments to have a negative, although slightly filtered, visual impact on dispersed dwellings and settlements from the surrounding, expansive landscape.			Slight Adverse
	Heritage/ Historic Resources	There are no recorded archaeological sites within the line of this option but several recorded sites are located within the vicinity. It is likely that further unrecorded archaeological sites are present within the line of the route. Therefore, it is possible that groundworks could impact negatively upon any such archaeological sites.			Slight Adverse
	Biodiversity	There are potential moderate adverse impacts on protected species of mammals and birds, in particular to populations of otter and bat. Loss of field boundaries and widened or extended crossings of water courses will result in localised loss of riparian habitat. Loss of low quality marshy grassland may also occur.			Moderate Adverse
	Water Environment	The off-line part of the route will require two new crossings of watercourses, which will included a new structure over the Ballylinny Burn. The remaining online section of the scheme will require the enlargement, replacement and/or extension of the culverts carrying the existing A8 over three additional watercourses. This route crosses some 300m of floodplain.			Slight Adverse
	Physical Fitness	The proposed carriageway would include formal provision for pedestrians and cyclists along the length of the southbound carriageway and along sections of the northbound carriageway. In addition the existing A8 would be retained for local traffic creating a less trafficked route with increased amenity value.			Moderate Benefit
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak times. All these factors would contribute to an enhanced driving experience along this section of the A8.			Moderate Benefit

Safety	Accidents	Improvement on existing single carriageway. 5 no. left-in left-out junctions, two left-in left-out access, lengths of parallel carriageway were identified by a Road Safety Auditor as potential safety hazards.		Slight Benefit
	Security	Route A2 would provide improved footways and pedestrian facilities along the route. However, the number of people using these facilities is predicted to be low.		Neutral
Economy	Public Accounts		2009 Q1 cost estimate £16,234,532	Total cost estimate £16,234,532
	Transport Economic Efficiency: Business Users			Not Assessed
	Transport Economic Efficiency: Consumer Users			Not Assessed
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with bus stops provided on the A8.		Neutral
	Severance	The bypass of Bruslee would reduce the severance between facilities in the settlement on either side of the existing A8, although the number of pedestrian and cyclist journeys is low.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the A8 will be incorporated into the proposals.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little/no benefit because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

9.5 Route A3, Outer Eastern Bypass of Bruslee - DMRB Assessment

Route A3 would provide an outer bypass of Bruslee leaving the existing alignment after Coleman's Corner roundabout and rejoining the existing road just north of the Rushvale Road and Drumadowney Road Junction, with the remainder of the route online widening to the west of the existing carriageway.

Figure 9.3: Route A3 Plan



9.5.1 A3 Engineering Assessment

9.5.1.1 A3 Geometric Assessment

The Route A3 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard. Route A3 has also been developed to provide a continuous alignment through the Coleman's Corner junction to accommodate potential future upgrades of the junction to a grade separated junction.

The junction strategy would the be same as Route A2 with the existing roundabout at Coleman's Corner retained with left-in left-out junctions provided for the remaining side roads along the route There are no perceived geometric issues with any of the proposed junctions associated with Route A3.

The section of the existing A8 through Bruslee would be retained in a similar manner to Route A2 with access at the southern and northern ends. The existing A8 through Bruslee will be subject to the national speed limit of 60mph and the layout of the proposed junction at the northern end of the bypass will require a Departure from standard for the horizontal radii.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

9.5.1.2 A3 Structures

The structural requirements for this route would be the same as Route A2, requiring a single new structure (STW01) across the Ballylinny Burn.

9.5.1.3 A3 Drainage

Road drainage has been assessed and a drainage design strategy developed. The outcome of the assessment for this route was the same as Route A2, and confirmed that positive road drainage is achievable with outfalls into various watercourses crossing the route. For

the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

The watercourses crossed by Route A3 are the same as Routes A1 and A2 and therefore would require the same number of culverts (four), and a new structure across the Ballylinny Burn bridge (refer to Section 9.5.1.2).

9.5.1.4 A3 Utility Services

Route A3 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 9.11 below.

Table 9.11: Route A3 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Drumadowney Road.	101,000
Northern Ireland Water	A diversion of watermains along the existing A8 as Route A2 leaves the existing A8 just north of Coleman's Corner.	25,760
BT	Diversion of overhead BT lines in the region of Drumadowney Road and underground cables as the bypass rejoins the existing A8.	£9,060
	Total Costs	**£135,820**

Route A3 would be very similar to Route A2, impacting on the existing utilities which run along the eastern verge when it leaves and rejoins the existing A8. It would also impact on those which cross the proposed route. The main impact would be on the overhead power lines which cross the scheme just north of Drumadowney Road, the same as Route A1 and A2.

9.5.1.5 A3 Geotechnics

Route A3 would have similar geotechnical issues as Route A2. The ground conditions are generally superficial deposits, and Route A3 would impact on one small poorly drained area along the western edge of the A8. It may be necessary to dig out and replace some of the material in the poorly drained areas. Route A3 will be similar to Route A2 by forming a slight cutting during the off-line section; however this cutting will not be deep enough to intersect the basalt bedrock. There are no significant geotechnical issues associated with forming a foundation for the new dual carriageway.

There is not anticipated to be any contaminated material along Route A3.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 9.5.2.5.

9.5.1.6 Construction Issues

Route A3 is predominately off-line, with a short section of on-line widening at the northern end of the route. Route A3 would provide an off-line bypass around Bruslee and then an online solution between Drumadowney Road and Calhame Road. The off-line sections can be constructed with minimal disruption to the existing A8 traffic. The widening works however, are likely to require a temporary speed limit of 40mph on the A8 during the works, although it is envisaged both lanes of traffic could be maintained for the majority of the work. In a similar manner to Route A1 and A2, the construction of Route A3 may require the temporary closure of the some of the existing side roads during the construction period.

The construction of Route A3 would require the import of a relatively small amount of fill material which could be obtained from other sections of the scheme or from borrow pits adjacent to the site.

The construction of the one new structure across the Ballylinny Burn (STW01) will be off-line and therefore can be constructed without any phasing or traffic management requirements.

9.5.2 A3 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

9.5.2.1 A3 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route A3 are well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would increase by 23% in both 2016 and 2031, and the PM_{10} emissions by 60% and 68% in 2016 and 2031 respectively, the same as Routes A1 and A2.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However, the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

9.5.2.2 A3 Cultural Heritage

There are nine known recorded sites within the immediate vicinity of Route A3, however none of them lie within the path of the proposed route. It is therefore not anticipated that there will be any impacts to these sites.

Given the length of off-line section of the route, it is likely there are other, unknown archaeological sites within the route footprint especially within greenfield areas. Therefore there is a good probability that works associated with this route would impact on previously unidentified deposits of archaeological potential.

Although this route will not impact upon known recorded sites, the amount of development through greenfield land may result in a *Slight Adverse* impact upon unknown archaeology.

9.5.2.3 A3 Landscape

This route lies wholly within the Tardee and Six Mile Water Slopes LCA and would have a similar impact to Route A2, however it would avoid the Tree Preservation Order to the east of Bruslee. The sensitivity of the wider landscape can be considered low to medium sensitivity and the assessment suggests that this route would have a *Moderate Adverse* effect. However, this should be tempered with a slight beneficial effect on the townscape of Bruslee.

Route A3 would have a similar visual effect as Route A2 and therefore has been assessed as *Moderate Adverse*.

9.5.2.4 A3 Nature Conservation

The impact of this route will be similar to Route A2, although the route is off-line for a greater distance and therefore potentially may have a greater impact.

The principle impact from this route would be the same as Route A2, with areas of habitat loss, new structures required at river crossings and hedgerow loss where there is not existing impact from traffic. The possible presence of badgers, birds and salmonid species along the route could result in adverse impact on these species, of most significance on bats and otters. Overall Route A3 will have a *Moderate Adverse* effect.

9.5.2.5 A3 Materials

Route A3 will have a similar impact on geology and materials as Route A1 and A2. Although it will require more fill material than Route A1 the volumes are still relatively small. Route A3 is off-line for the majority of Section A therefore requiring a completely new road structure and providing little opportunity to incorporate the existing infrastructure. Therefore the overall affect on geology and materials is considered to be *Slight Adverse.*

9.5.2.6 A3 Noise

In terms of overall Noise impact with Route A3 the rear facades of dwellings along the eastern side of the existing A8 may be subject to a major adverse impact, although this would be slightly less than with Route A2. However, dwellings further to the east would be subject to a moderate or major impact, in particular a group or properties in the vicinity of where Route A3 rejoins the existing A8. Table 9.12 provides the results of the noise assessment for Route A3 in 2031.

Table 9.12: Route A3 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	36	36	0	0
0.1 – 0.9	895	62	7	1
1 – 2.9	60	6	0	0
3 – 4.9	18	1	0	0
5+	14	7	0	1
Total	**987**	**76**	**7**	**2**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

9.5.2.7 A3 Effects on all Travellers

The effect on travellers is considered to be the same as Route A2. Therefore the overall effect on All Travellers for this route would be *Moderate Beneficial***,** based on the benefits for vehicle travellers, pedestrians and cyclists.

9.5.2.8 A3 Community and Private Assets

Route A3 would remove the existing A8 from Bruslee in a similar manner to Route A2, and has no impact on the community facilities within the settlement. The existing A8 would remain to serve local properties and less traffic along this section of the road would make access to the community facilities safer and improve the amenity of the settlement. The effects of this route on Community Assets would be *Slight Beneficial***.**

This route would require the demolition of one residential property (currently under construction). One further residential property would be impacted through some loss of gardens. In addition approximately 105 hectares of Grade 3b agricultural land would be lost to the scheme. Three farm businesses have been identified one would endure a slight adverse impact and the other two would endure a moderate adverse impact on the management, performance and future viability. Seven further agricultural units were identified where the land is currently rented out. The overall effect of Route A3 on Private Assets would be *Slight Adverse.*

9.5.2.9 A3 Road Drainage and the Water Environment

The impacts of this route on the water environment are similar to Route A2. The route crosses the same watercourses, although will require three new watercourse crossings on the off-line section, including a new structure over the Ballylinny Burn. Route A3 will also cross approximately 550m of floodplain.

The key impact for this route is the potential impact to flooding and loss of flood storage. The impact on the water environment has been assessed to be *Slight Adverse.*

9.5.3 A3 Cost Estimate

The Stage 2 cost estimate for Route A3 is presented in Table 9.13, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 9.13: Route A3 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**9,177,664**
Contractors Overheads & Profit (10%)	£	917,766
Sub Total	**£**	**10,095,430**
Land Costs and Compensation	£	1,159,900
Preparation, surveys, design (9%)	£	908,589
Supervision (5%)	£	504,772
Contingency/Risk Allowance	£	894,030
Sub Total	**£**	**13,562,722**
Optimism Bias *(20% construction, 5% land and compensation)*	£	2,538,559
TOTAL ESTIMATED COST	**£**	**16,101,280**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£16,101,280**.

9.5.4 A3 Traffic Assessment

The central growth traffic forecast for Route A3 for the design year, 2031, are the same as Route A1 and were developed for each of the different routes around Ballynure. The forecast traffic volumes vary depending on the choice of route around Ballynure, and therefore a range of traffic flows have been presented in Table 9.14 below.

Table 9.14: Route A3 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Direction	Annual Average Daily Traffic (AADT)	Total 2-way AADT
A8 (Coleman's Corner to B95 Green Road)	Northbound	8,757 – 9,044	17,562 – 17,850
	Southbound	8,388 – 8,806	
B95 Hillhead Road	Eastbound	5,204 – 5,879	11,112 – 11,267
	Westbound	5,284 – 5,912	

The old section of the A8 through Bruslee will cater for local traffic to residential properties and businesses. The forecast traffic flows will be low and are therefore not reported in the table.

9.5.5 A3 Economic Assessment

The forecast traffic flows for all routes in Section A are the same (as summarised in Table 9.11 and outlined in Section 5.3), and therefore the benefits of the scheme for the route options in this section will be the same. Therefore a full economic assessment of the Section A routes has not been undertaken, because the only difference in the performance

of individual routes will be the difference in capital costs. As outlined in Section 9.5.4, the total cost estimate for Route A3 is **£16,101,280.**

9.6 Route A3, Outer Eastern Bypass of Bruslee - WebTAG Appraisal

9.6.1 A3 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 9.5.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separated report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the appraisal of the environmental objective are provided in the AST in Section 9.6.7.

9.6.2 A3 Safety Objective

9.6.2.1 A3 Accidents Sub-Objective

The quantitative accident benefits are determined using the forecast traffic flows and the proposed road layout. The forecast traffic flows for all routes in Section A are the same (as summarised in Table 9.11 and outlined in Section 5.3) and the proposed road layouts are similar. Therefore a full quantitative accident assessment of the Section A routes has not been undertaken, although a qualitative assessment has been provided below to assist in the comparison of routes.

A full quantitative accident assessment of the whole scheme, incorporating the preferred routes for Sections A, B and C, has been undertaken and is reported in Chapter 12.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route A3 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Four left-in/left-out junctions are proposed for: Lisglass Road, Logwood Road, the severed end of the existing A8 and Rushvale Road. Route A3 would also include two left-in left-out accesses serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles. There is one less left-in/left-out junction on the proposed A8, than the other Section A routes, which will offer an improvement in terms of mainline safety.
- There are potential differences in traffic flows at the junction of Logwood Road with the B95 Hillhead Road, and the new proposed connection at the southern end of the severed A8. These junctions will need detailed consideration to ensure no deterioration in safety.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction, Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during the works. The major activities identified are:

- Demolition of 1 building (under construction at time of writing this report);
- Construction of Ballylinny Burn bridge;
- Limited construction work alongside existing utilities; and
- Traffic Management associated with online widening over approximately 0.5km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route A3 involves the construction of a new structure and four culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

9.6.2.2 A3 Security Sub-Objective

Route A3 would provide improved footways and pedestrian facilities along the route in a similar manner to Route A2 and therefore the qualitative assessment score for this sub-objective would be the same, *Neutral.*

9.6.3 A3 Economy Objective

As outlined in Section 9.5.5 a full economic assessment of the different Section A routes has not been undertaken because the forecast traffic flows are the same, and therefore the benefits will be the same. Therefore only the capital cost estimate for the scheme is presented in the Route A3 AST in Section 9.6.7. A full economic assessment of the complete scheme, incorporating the preferred routes for Sections A, B and C has been undertaken and is reported in Chapter 12.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route A3 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

9.6.4 A3 Accessibility Objective

9.6.4.1 A3 Option Values Sub-Objective

The public transport provision on Route A3 will be the same as Route A2. The qualitative assessment of the impact of Route A3 on Option Values would be *Neutral*.

9.6.4.2 A3 Severance Sub-Objective

The key area for pedestrians and cyclists within Section A is Bruslee. The existing A8 represents an obstacle between residential properties and community facilities within Bruslee (see Section 9.5.2.8). The bypassing of the settlement would reduce the severance between facilities on either side of the existing A8. The number of non-motorised user journeys within Bruslee is low and therefore the impact on the severance sub-objective would be S*light Positive,* the same as Route A2.

9.6.4.3 A3 Access to the Transport System Sub-Objective

The public transport provision on Route A3 will be similar to the existing, with bus stops provided on the new dual carriageway. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low therefore the qualitative assessment of this sub-objective would be *Neutral* for Route A3.

9.6.5 A3 Integration Objective

9.6.5.1 A3 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section A are the existing bus stops along the A8. The proposed scheme would provide similar facilities along the new dual carriageway. However, the passenger numbers for these bus stops are very low and therefore the impact on this sub-objective would be *Neutral.*

9.6.5.2 A3 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation. Further design development will be required to mitigate or minimise impacts.

9.6.5.3 A3 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route A3, would be *Beneficial.*

9.6.6 A3 Supporting Analysis

9.6.6.1 A3 Affordability

The Route A3 scheme costs is reported in Section 9.5.3 with a total cost estimate of **£16,101,280** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

9.6.6.2 A3 Practicality

The Practicality of Route A3 is reported in the Section 9.5.1.6 of the engineering assessment.

9.6.6.3 A3 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is public support and acceptability for the A8 improvements, however in relation to the route of the dual carriageway at Bruslee there was no clear public preference on whether it should be an off-line solution, which is equivalent to Route A3, or an online solution.

9.6.7 A3 Appraisal Summary Table

The appraisal for Route A3 is summarised and presented in an AST, overleaf.

Table 9.15: Route A3 Appraisal Summary Table

Route A3, Outer Eastern Bypass of Bruslee		**Description:** Route A3 would provide an outer bypass of Bruslee leaving the existing alignment after Coleman's Corner roundabout and rejoining the existing road just north of the Rushvale Road and Drumadowney Road, with the remainder of the route online widening to the west of the existing carriageway.	**Problems:** Loss of proposed dwelling site, loss of agricultural land and impact on landscape and biodiversity.	**Total cost estimate:** £16,101,280
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	Estimated Population Annoyed (Without Scheme): 130 Estimated Population Annoyed (With Scheme): 133		Net Noise Annoyance: 3
	Local Air Quality	There are a total of 83 properties within 200m of the proposed Option A3 route corridor. In 2016, 50 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 59 properties are predicted to experience an improvement when taking into account the reduced population exposure.	The net change for NO_2 would be -221 for the assumed design year 2031, with -234 for PM_{10} and -211 for $PM_{2.5}$.	83 properties within 200m
	Greenhouse Gases	Slight increase in greenhouse gases		Slight Adverse
	Landscape	On-line the local impacts are primarily loss of boundary features including hedgerows and trees the filtering effect these provide on the existing A8 to wider views. The offline route will sever and sub-divide existing field pattern and lessen the relative tranquillity, but will follow the grain of the landscape.		Moderate Adverse
	Townscape	There is likely to be limited potential visual impact on existing housing located on the eastern periphery of Bruslee. There is also potential for proposed bridge structures and the new road alignments to be have a filtered but negative visual impact on dispersed dwellings and settlements from the surrounding, expansive landscape. There will be impact to private houses within Bruslee and those close to the proposed off-line route with a slight adverse impact on the layout and culture of the settlement, but a neutral impact on other aspects of Townscape.		Slight Adverse
	Heritage/ Historic Resources	There are no recorded archaeological sites within the line of this option. It is likely that further unrecorded archaeological sites are present within the line of the route. Therefore, it is likely that groundworks could impact negatively upon such archaeological sites.		Slight Adverse
	Biodiversity	There are potential moderate adverse impacts on protected species of mammals and birds. Loss of field boundaries and widened or extended crossings of water courses will result in localised loss of riparian habitat resulting in a slight adverse impact. Loss of low quality marshy grassland may also occur and result in a moderate adverse impact.		Moderate Adverse
	Water Environment	The off-line part the route will require three new crossings of watercourses, which will included a new structure over the Ballylinny Burn. The remaining online section of the scheme will require the enlargement, replacement and/or extension of the culverts carrying the existing A8 over these watercourses. This route crosses some 550m of floodplain.		Slight Adverse
	Physical Fitness	The proposed carriageway would include formal provision for pedestrians and cyclists along the length. In addition the existing A8 would be retained for local traffic creating a less trafficked route with increased amenity value.		Moderate Benefit
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak times and improvement in route certainty though better signage and road design/layout. All these factors would contribute to an enhanced driving experience along this section of the A8.		Moderate Benefit

Safety	Accidents	Improvement on existing single carriageway. 4 no. left-in left-out junctions, 2 No. left-in left-out access, lengths of parallel carriageway were identified by a Road Safety Auditor as potential safety hazards.		Slight Beneficial
	Security	Route A3 would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		2009 Q1 cost estimate £16,101,280	Total cost estimate £16,101,280
	Transport Economic Efficiency: Business Users			Not Assessed
	Transport Economic Efficiency: Consumer Users			Not Assessed
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Bruslee would reduce the severance between facilities in the settlement on either side of the existing A8, although the number of pedestrian and cyclist journeys is low.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little/no benefit because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

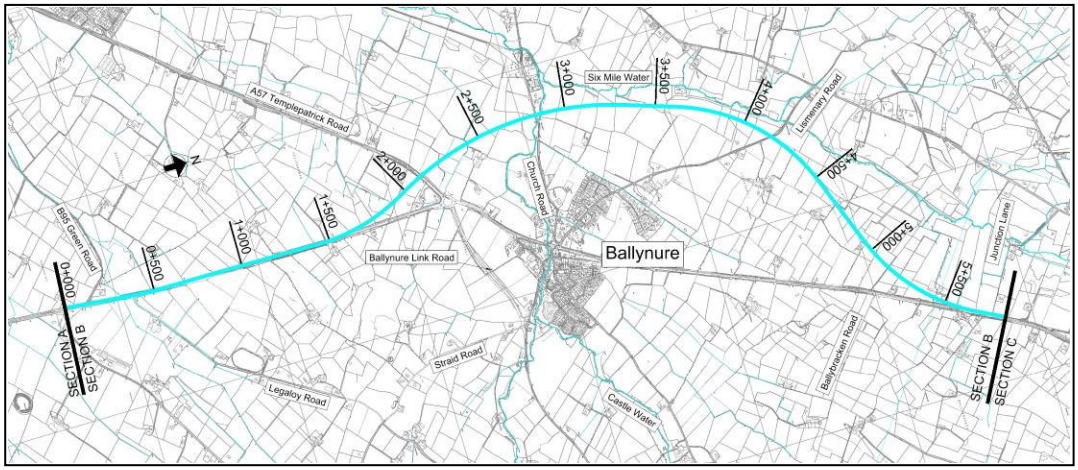
10 Section B – Assessment and Appraisal

Section B considers the bypass route options available at the village of Ballynure. The Stage 2 Assessment has considered both eastern and western bypass route options.

10.1 Route B1, Outer Western Bypass of Ballynure – DMRB Assessment

Route B1 is detailed in Section 7. In summary, it would provide an outer bypass to the west of Ballynure leaving the existing alignment approximately 550m south of the existing A57 (Templepatrick Road) roundabout. The route would then initially head northwest before following the Six Mile Water around the village and then rejoining the existing A8 prior to Junction Lane.

Figure 10.1: Route B1 Plan



10.1.1 B1 Engineering Assessment

10.1.1.1 B1 Geometric Assessment

The Route B1 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

The junction strategy was previously discussed in Section 5.5, which outlined that compact grade separated junctions would be provided at Green Road/ Calhame Road/ Legaloy Road and Ballybraken Road, with a new full grade separated junction provided at the A57 Templepatrick Road. Church Road and Lismenary Road would be maintained with a connection across the scheme, but with no connection to the new dual carriageway.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junctions at either end of Route B1 will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting Calhame Road into the southern junction and the old A8 into the northern junction. In addition, the connection onto the southbound carriageway from the A57 Templepatrick Road junction will require a Departure for the horizontal radii.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

10.1.1.2 B1 Structures

Route B1 would require five new structures:

- STJ21 – Green Road/ Calhame Road/ Legaloy Road Junction Overbridge;
- STJ22 – A57 Templepatrick Road/ B58 Carrickfergus Road Junction Overbridge;
- STW02/STR41 – Ballynure Water and Church Road Underbridge;

- STR42 – Lismenary Road Underbridge; and
- STJ23 – Ballybraken Road Junction Overbridge.

Geometrically, all five structures would be relatively simple with the road bridges having reasonable straight alignments. The structures will generally have perpendicular crossings with the exception of STR42 which will have a slight skew.

STJ21 would be constructed on the line of the existing route. This would require more significant traffic management and make access to the works more difficult.

STW02/STR41 will be constructed over Church Road and it may be appropriate to close Church Road temporally during the works to simplify the construction of this bridge.

STJ22, STR42 and STJ23 would be constructed slightly off-line of the existing A8, or respective side roads making construction simpler.

10.1.1.3 B1 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route B1 confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. However, to achieve adequate fall between the road level and the watercourse, some of the online sections of the proposed dual carriageway would need to be raised above the existing road level. For the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

Cross drainage was modelled using the 1-in-100 year flows for the various catchments with an additional flow of 20% to account for climate change, and culvert sizes were calculated using these flows. For Route B1, there would be a total of two culverts with one bridge (refer to Section 10.1.1.2). The deepest culvert was for the Green Burn which would be 2100mm deep.

10.1.1.4 B1 Utility Services

Route B1 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water, Bord Gais Networks and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 10.1 below.

Table 10.1: Route B1 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Ballynure.	356,00
Northern Ireland Water	Diversions of watermains and sewers along the A8, and the watermain crossing the route adjacent to Lismenary Road.	212,490
Bord Gais Networks	Diversion/protection of gas main south of Ballybraken Road.	1,416,080
BT	Diversion of overhead and underground BT lines crossing the route at various points.	322,730
	Total Costs	**£2,307,300**

Route B1 would impact on the existing utilities mainly on the online sections, with other impacts on the off-line sections where the route crosses utilities. The main impact would be on the high pressure gas main to the north of Ballynure, watermains along the A8 and the

overhead electricity cables (110kv) which cross the scheme just north of the Ballybraken Road.

10.1.1.5 B1 Geotechnics

Ground conditions are generally superficial deposits, however there is an area of soft alluvial clay near the southern end of the route, and gravelly alluvial deposits across the Ballynure Water valley bottom. It may be necessary to dig out and replace some of the material in the poorly drained areas. The cut earthworks associated with Route B1 are likely to intersect the basalt bedrock. No areas of possible contamination have been identified along this route.

North of Ballynure Water, there are no springs and risings in the vicinity of the alignment, however preliminary ground investigations indicated shallow groundwater. It is believe that the groundwater probably flows laterally within the fractured basalt bedrock. Drainage measures may be needed to mitigate the groundwater flow discharging into the cut earthworks.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 10.1.2.5.

10.1.1.6 B1 Construction Issues

The online sections of Route B1 would generally retain the existing carriageway and widen it to the west. This will result in some disruption to the existing A8 traffic during construction. The widening works are likely to require a temporary speed limit of 40mph on the A8 during the works, although it is envisaged that both lanes of traffic could be maintained for the majority of the work. The construction of Route B1 may however require the temporary closure of some of the existing side roads during the construction period.

The construction of Route B1 would require the significant import of additional material (approximately 700,000 cubic metres). It is assumed this additional fill material could be obtained from borrow pits on or adjacent to the site.

One of the new overbridges, STJ21 would be constructed on the line of the existing A8 and significant traffic management would make access to the works more difficult. The remaining structures would be constructed off-line making the construction process simpler.

10.1.2 B1 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

10.1.2.1 B1 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route B1 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would significantly increase by 73% and 56% in 2016 and 2031 respectively, and the PM_{10} emissions by 120% and 103% in 2016 and 2031 respectively.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

10.1.2.2 B1 Cultural Heritage

There are ten known recorded local sites within the immediate vicinity of Route B1. Only two of these sites have been physically located, however are not directly affected by the route. The remainder have been given general locations with their respective townlands by NIEA: Built Heritage, and Route B1 could impact on two of these sites. There are also seven

recorded Industrial Heritage sites within the vicinity of Route B1. The only site which may be impacted is Mearne's Bridge, which is crossed by Route B1, however no trace of this site was observed during a site visit.

The footprint of this option will run through a large expanse of open land and there is a probability that ground works associated with this route will impact upon previously unrecorded deposits of archaeological potential.

The assessment of Route B1, based on the possible impact on two known sites and the potential impact to unknown archaeology, has a *Slight Adverse* impact upon Cultural Heritage.

10.1.2.3 B1 Landscape

This route affects three LCAs; the Tardee and Six Mile Water Slopes, the Three and Six Mile Water Valleys and the Larne Ridgeland LCA. The combination of LCAs introduces a subtle, more distinct and diverse, and changeable landscape. The southwest facing valley sides west of Ballynure are generally characterised by small to medium sized fields whose axis are aligned east to west, with riparian, mature trees picking out the course of the Ballynure Water. North of Ballynure there is distinct change in field size and pattern. A finer grain is evident with more irregular field shapes. The sensitivity of the wider landscape can be considered low to medium sensitivity

Route B1 would have a direct effect on the relatively fine grain and traditional field pattern, as it passes around the southwest of Ballynure. The route would be on an embankment to the west of Ballynure, which would have a marked physical impact on this landscape. The assessment suggests that this route would have a *Moderate Adverse* effect on Landscape. The overall landscape effect should however be tempered with a slight beneficial effect on townscape within Ballynure.

Route B1 would be visually prominent across a wide area in the Six Mile Water valley. In the near distance the route would visually affect the 'Ballynure River' Landscape Policy Area, and in the more expansive visual envelope would have a visual impact on views to and from the AONB. There is a formalised viewpoint located on the Larne Basalt Moorland with potential elevated views across the A8 corridor, but this is obscured by dense coniferous plantation. The proposed junction arrangements would have a visual effect in the wider landscape, however Route B1 would have minimal visual effect on properties on the western edge of Ballynure, due largely to subtle local topography variations on the valley slope. This route would have a *Moderate Adverse* visual effect.

10.1.2.4 B1 Nature Conservation

There are no statutory or non-statutory designated sites within, or adjacent to this route. The principal habitats affected are Ballynure Water and those close to Six Mile Water, in addition, to these field boundaries such as hedgerows, areas of improved grasslands, and areas of scattered trees will be lost to the route footprint. The online section of the route may also affect two areas of marshy grassland, with the off-line section affecting a further two areas. A visual survey of the largest of these areas suggested that the area has become degraded over time.

The surrounding area and features are considered suitable to support a number of protected species; otters, bats, badgers, and protected birds and fish. Data received from Centre for Environmental Data and Recording (CEDaR) showed records of three bird species in the proximity of the route which are Northern Ireland species of conservation concern. It also confirmed that the Six Mile Water contained salmonid species, principally brown trout and Atlantic Salmon. Although there are no records of these species in Ballynure Water, it is a tributary of the Six Mile Water and therefore such species may be present.

Although there are no formal records of otter, an otter slide was noted during the survey of the Six Mile Water. The close proximity of the route and extensive home ranges of otters

would suggest that there may be some impact on the otter population through loss of holts or resting places and disturbance caused by noise, dust and disruption. There are a number of buildings within close proximity to this route which could support bat roosts, and there are the potential effects on bats from loss of foraging areas and disruption of flight lines, especially with the off-line sections. There are areas considered suitable habitat for badgers and they may suffer direct impact in the form of restricted movement, habitat loss and road mortalities.

The possible presence of bats, otters and badgers along the route could result in adverse impact on these species. The key concerns are the potential impacts to populations of salmonid species and bird species of conservation concern, in addition to the habitat loss. Overall Route B1 will have a *Moderate Adverse* effect.

10.1.2.5 B1 Materials

The alignment of Route B1 crosses an area where the superficial deposits are relatively thin and locally absent. Therefore, many of the cut earthworks will intersect the basalt bedrock. An area of soft alluvial clay is present near the southern end of the route, and some made ground will be present associated with the existing A8.

South of the Ballynure Water there are several springs and risings in the vicinity of the route, which indicate the groundwater is close to the surface. North of Ballynure Water the Preliminary Ground Investigations indicates that there is shallow groundwater, however as there are no springs or risings, the groundwater probably flows laterally within the fractured bedrock. Cuttings associated with Route B1 may intersect this flow of water, which would require measures to prevent impacts to the groundwater flow.

The proposed route would require a considerable amount of fill material during the ground works, and this amount of material could not be won from other sections of the route, and would therefore need to be imported. Therefore the overall affect on geology and materials is considered to be *Moderate Adverse*.

10.1.2.6 B1 Noise

The main noise impacts would be on dwellings along Church Road and houses to the east of Lismenary Road which would be subject to moderate and major adverse impacts. However, dwellings in the centre of Ballynure and those along Castletown Road and Legaloy Road will be subject to major beneficial impact, as traffic is diverted along the new A8 alignment. Table 10.2 provides the results of the noise assessment for Route B1 in 2031.

Table 10.2: Route B1 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	3	3	0	0
0.1 – 0.9	82	28	0	0
1 – 2.9	154	46	0	2
3 – 4.9	99	30	1	0
5+	173	17	2	0
Total	**508**	**121**	**3**	**2**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

10.1.2.7 B1 Effects on all Travellers

The overall scheme proposals would improve the existing facilities for pedestrians and cyclists, affording safe provision along the carriageway between community facilities. Route B1 would remove the A8 from Ballynure reducing the traffic levels through the village and increasing pedestrian and cyclist safety.

Route B1 would provide an important route for vehicle travellers, with a dual carriageway providing more free flowing conditions. Improvements in travelling times and the inclusion of a permanent, safe overtaking opportunity would lead to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Moderate Beneficial*.

10.1.2.8 B1 Community and Private Assets

As with all the options being considered, Route B1 would improve the existing main road corridor and contribute to an overall improvement to the local road network and connectivity with wider community facilities. This route is the most westerly option and it would not result in any direct impacts on community facilities within Ballynure. It is anticipated that local traffic, pedestrians and cyclists will benefit from the removal of high volumes of through traffic from the village. This would reduce the current level of severance experienced in the village. The overall effect on Community Assets would be *Slight Beneficial.*

Five residential properties would be impacted through some loss of gardens and approximately 342 hectares of Grade 3b and Grade 2 agricultural land would be lost to the scheme. Thirteen farm businesses have been identified which would endure an adverse impact on the management, performance and future viability. Three have been assessed to be significant adverse, three moderate adverse and seven slight adverse impacts. Ten further agricultural units were identified where the land is currently rented out. The overall effect of Route B1 on Private Assets would be *Moderate Adverse*.

10.1.2.9 B1 Road Drainage and the Water Environment

Route B1 crosses Green Burn, Ballynure Water and one other tributary. This route would require a new structure across Ballynure Water, and the enlargement, replacement and/or extension of the culverts for the other watercourses. The principle impacts on these watercourses will be the potential for increased velocity and volume of road runoff, and the risk of pollution from road runoff during construction and operation.

Groundwater is known to lie close to the surface at various locations adjacent to the existing A8. Potential impacts to this resource may include alterations to natural drainage patterns due to the introduction of new road infrastructure. This route would also follow the route of the Six Mile Water and be within 50m of it at its closest point.

The key impact for this route is the significant increase in impermeable surface, new crossing of Ballynure Water, and its location next to the Six Mile Water which combine to create a cumulative impact resulting in a *Slight Adverse* impact.

10.1.3 B1 Cost Estimate

The Stage 2 cost estimate for Route B1 is presented in Table 10.3, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 10.3: Route B1 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**34,362,187**
Contractors Overheads & Profit (10%)	£	3,436,219
Sub Total	**£**	**37,798,405**
Land Costs and Compensation	£	4,001,300
Preparation, surveys, design (9%)	£	3,401,856
Supervision (5%)	£	1,889,920
Contingency/Risk Allowance	£	1,517,645
Sub Total	**£**	**48,609,127**
Optimism Bias *(20% construction, 5% land and compensation)*	£	9,121,630
TOTAL ESTIMATED COST	**£**	**57,730,757**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£57,730,757**.

10.1.4 B1 Traffic Assessment

Route B1 has been represented by the Western Outer Bypass option in the traffic model (see section 5.3). The central growth traffic forecasts for Route B1 for the design year, 2031, are presented in Table 10.4 below.

Table 10.4: Route B1 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Do-Minimum without dual carriageway		Do-Something with Route B1	
	(Total 2-way AADT)	(*Total 2-way HGV AADT)*	*(Total 2-way AADT)*	(*Total 2-way HGV AADT)*
A8 (B95 Green Road to A57 Templepatrick Road)	16,005	1,920	17,126	1,883
New A8 (A57 Templepatrick Road to Ballybraken Road)	n/a	n/a	22,010	2,861
Original A8 (through Ballynure)	22,559	3,158	2,422	48
A57 Templepatrick Road	11,007	1,541	11,633	1,396
B58 Carrickfergus Road	4,489	584	5,101	510

10.1.5 B1 Economic Assessment

The economic assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme economics for each different route within Section B. Table 10.5 provides a summary of the economic performance, of the entire scheme, with Route B1. The full Transport Economic Efficiency tables are included in Appendix E.

Table 10.5: Route B1 Economic Assessment

Cost or Benefit	Value	Comments
Present Value of Benefits (PVB)	£118.9m	
Present Value of Costs (PVC)	£82.3m	
Net Present Value (NPV)	£36.6m	NPV = PVB – PVC
Benefit to Cost Ratio	1.45	BCR = PVB / PVC

It can be seen that the results of the economic assessment would indicate that Route B1 would be likely to deliver a benefit to cost ratio (BCR) of 1.45, with a net present value (NPV) of £36.6m.

10.2 Route B1, Outer Western Bypass of Ballynure – WebTAG Appraisal

10.2.1 B1 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 10.1.2 and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the AST in Section 10.2.7.

10.2.2 B1 Safety Objective

10.2.2.1 B1 Accidents Sub-Objective

The quantitative accident assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme accident statistics for each different route within Section B. Table 10.6 provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual carriageway with Route B1 adopted within Section B.

Table 10.6: Route B1 Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	9	18	-242	-215	-142	5,022
Accident Savings based on COBA rates	39	202	940	1,150	702	56,733

Table 10.6 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway would result in an increase in the number of slight injury accidents when compared to a do-minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that some slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single carriageway, as demonstrated by the comparison against the COBA rates for a single

carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route B1 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Route B1 would include two left-in left-out access serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Green Road Junction – the southbound left-off leads to a T-junction connection with the diverted B95 Calhame Road. There is a potential for a queue to form which would not be obvious to left turning southbound drivers on the A8, as visibility could be obstructed by a bridge abutment and embankment slopes. This could lead to rear-end shunt collisions.
- B95 Calhame Road – Sharp bend to turn back to the new junction. Possibility of excessive approach speed leading to loss of control.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during works. The major activities identified are:

- Construction of five new structures, one structure on the line of the existing A8;
- Construction work alongside existing utilities; and
- Traffic Management associated with online widening over approximately 2.0km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route B1 involves the construction/replacement of five new structures and two culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

10.2.2.2 B1 Security Sub-Objective

Route B1 would provide improved footways and pedestrian facilities along the route, and remove the through traffic from Ballynure. However, based on the guidance in WebTAG Unit 3.4.2 and the low number of people using the facilities, the qualitative assessment score for this sub-objective would be *Neutral.*

10.2.3 B1 Economy Objective

The results of the economic assessment for Route B1, as outlined in Section 10.1.5 are presented in the Route B1 Appraisal Summary Table in Section 10.2.7, with the full Transport Economic Efficiency tables included in Appendix E.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route B1 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

10.2.4 B1 Accessibility Objective

10.2.4.1 B1 Option Values Sub-Objective

The public transport provision on Route B1 and within Ballynure would be similar to the existing, with existing bus stops in Ballynure retained. The qualitative assessment of Route B1 on Option Values would be *Neutral* based on no changes to the availability of transport services.

10.2.4.2 B1 Severance Sub-Objective

The key area for pedestrians and cyclists within Section B is Ballynure. The existing A8 represents a major obstacle in the village between residential properties and community facilities (see Section 10.1.2.8). The community facilities within Ballynure are currently split with the school, park and a church on western side, and two further churches and shops on the eastern side.

Route B1 would remove the A8 from the centre of Ballynure therefore providing little or no hindrance to pedestrian movements within the village. The impact on the severance sub-objective would be S*light Positive*.

10.2.4.3 B1 Access to the Transport System Sub-Objective

The public transport provision on Route B1 will be similar to the existing, with existing bus stops in Ballynure retained. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low therefore the qualitative assessment of this sub-objective would be *Neutral* for Route B1.

10.2.5 B1 Integration Objective

10.2.5.1 B1 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section B are the existing bus stops along the A8 and in Ballynure. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

10.2.5.2 B1 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation. Further design development will be required to mitigate or minimise impacts.

10.2.5.3 B1 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route B1 would be *Beneficial.*

10.2.6 B1 Supporting Analysis

10.2.6.1 B1 Affordability

The Route B1 scheme costs is reported in Section 10.1.3 with a total estimate cost of **£57,730,757** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

10.2.6.2 B1 Practicality

The Practicality of Route B1 is reported in the Section 10.1.1.6 of the engineering assessment.

10.2.6.3 B1 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. Route B1 is to the west of Ballynure, and within Sub-corridor A (as discussed in Section 6.4.1). The public response indicated there was no clear public preference on an eastern or western bypass of the village, and the further question asking members of the public to rank the Sub-Corridors in order of preference provided no clear preference.

10.2.7 B1 Appraisal Summary Table

The appraisal for Route B1 is summarised and presented in an Assessment Summary Table (AST), overleaf.

Table 10.7: Route B1 Appraisal Summary Table

Route B1, Outer Western Bypass of Ballynure			**Problems:** Loss of agricultural land, proximity to Six Mile Water and impact on landscape and biodiversity.	**Present value of costs to public:** £82.3 million*
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	Estimated Population Annoyed (Without Scheme): 39 Estimated Population Annoyed (With Scheme): 56		Net Noise Annoyance: 17
	Local Air Quality	There are a total of 505 properties within 200m of the proposed route corridor. In both 2016 and 2031, 70 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 435 properties are predicted to experience an improvement.	The net change for NO_2 would be -588 for the assumed design year 2031, with -74 for PM_{10} and -67 for $PM_{2.5}$..	505 properties within 200m
	Greenhouse Gases	Change in Carbon Emissions over 60 year appraisal period (tonnes): 62,379*		£2.6m*
	Landscape	The route would impact upon the Three and Six Mile Water Valley Local Character Areas which has a distinct landscape and visual appeal that is highly legible and has distinct local cultural associations around Ballynure Water and recent industrial archaeology and land uses		Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings but less directly on existing dwellings on the periphery of the village. Where the route passes Ballynure there is potential slight adverse impact on setting for townscape and industrial landscape features of cultural significance.		Neutral
	Heritage/ Historic Resources	This route crosses one Industrial Heritage site, however no trace of the site was observed during a site visit. In addition, it runs through areas of greenfield that would have subsurface archaeological potential.		Slight Adverse
	Biodiversity	Potential adverse effects on protected species. Loss of field boundaries, improved grassland and low quality marshy grassland may also occur. New or enlarged structures will be required for a number of water courses including Ballynure Water.		Moderate Adverse
	Water Environment	The route crosses the Green Burn, Ballynure Water and another minor watercourses, the route will be within 30m of Six Mile Water at its closes point.		Slight Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclists. Removing through traffic from the settlement of Ballynure would increase pedestrian and cyclist safety, activity and connectivity with community facilities.		Moderate Beneficial
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak. Improvement to junction would reduce driver stress for local and through traffic. All these factors would contribute to an enhanced driving experience along this section of the A8.		Moderate Beneficial
Safety	Accidents	Improvement on existing single carriageway. 2 No. left-in left-out access, tight radius bend on Calhame Road and T-junction on Green Road were identified by a Road Safety Auditor as	Accident Benefits = £5.0m*	Slight Beneficial

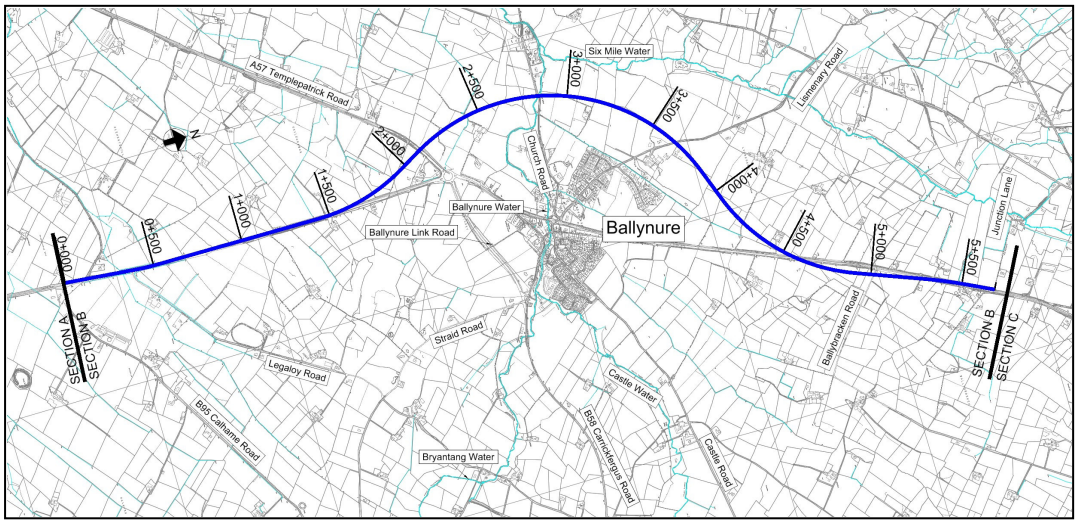
		potential safety hazards.		
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		Central Government PVC = £ 82.3 million*	PVC = £82.3m*
	Transport Economic Efficiency: Business Users		Business Users PVB = £78.7 million*	PVB = £78.7m*
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £37.8 million*	PVB = £ 37.8m*
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Corridor Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Ballynure would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

* Figures calculated for the whole scheme with constant routes within Section A and C

10.3 Route B2, Inner South-western Bypass of Ballynure - DMRB Assessment

Route B2 is detailed in Section 7. In summary, it would provide an inner bypass to the west of Ballynure leaving the existing alignment approximately 550m south of the existing A57 (Templepatrick Road) roundabout. The route would then head northwest, before being aligned around, but close to, the edge of Ballynure, and rejoining the existing A8 approximately 400m before Junction Lane.

Figure 10.2: Route B2 Plan



10.3.1 B2 Engineering Assessment

10.3.1.1 B2 Geometric Assessment

The Route B2 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

The junction strategy was previously discussed in Section 5.5, which outlined that compact grade separated junctions would be provided at Green Road/ Calhame Road/ Legaloy Road and Ballybraken Road, with a new full grade separated junction provided at the A57 Templepatrick Road. Church Road and Lismenary Road would be maintained with a connection across the scheme, but with no connection to the new dual carriageway.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junction at Green Road/ Calhame Road/ Legaloy Road will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting Calhame Road into the junction. In addition, the connection onto the southbound carriageway from the A57 Templepatrick Road junction will require a departure for the horizontal radii.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

10.3.1.2 B2 Structures

Route B2 would require five new structures:

- STJ21 – Green Road/ Calhame Road/ Legaloy Road Junction Overbidge;
- STJ22 – A57 Templepatrick Road/ B58 Carrickfergus Road Junction Overbridge;
- STW02/STR41 – Ballynure Water and Church Road Underbridge;
- STR42 – Lismenary Road Overbridge; and

- STJ23 – Ballybraken Road Junction Overbridge.

Geometrically, all five structures would be relatively simple with the four overbridges having reasonable straight alignments. The structures will generally have perpendicular crossings with the exception of STR42 which will have a slight skew.

STJ21 would be constructed on the line of the existing route. This would require more significant traffic management and make access to the works more difficult. STW02/STR41 will be constructed over Ballynure Water and Church Road and it may be appropriate to close Church Road temporally during the works to simplify the construction of this bridge.

STJ22, STR42 and STJ23 would be constructed slightly off-line of the existing A8, or respective side roads making construction simpler.

10.3.1.3 B2 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route B2 is the same as B1 and confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. It would also require a total of two culverts with one bridge (refer to Section 10.3.1.2), the same as Route B1.

10.3.1.4 B2 Utility Services

Route B2 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water, Bord Gais Networks and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 10.8 below.

Table 10.8: Route B1 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Ballynure.	321,000
Northern Ireland Water	Diversions of watermains and sewers along the A8, and the watermain crossing the route adjacent to Lismenary Road.	775,170
Bord Gais Networks	Diversion/protection of gas main south of Ballybraken Road.	1,106,310
BT	Diversion of overhead and underground BT lines crossing the route at various points.	343,630
	Total Costs	**£2,546,110**

Route B2 would impact on the existing utilities mainly on the online sections, with other impacts on the off-line sections where the route crosses utilities. The main impact would be on the high pressure gas main to the north of Ballynure, watermains along the A8 and the overhead electricity cables (110kv) which cross the scheme just north of the Ballybraken Road.

10.3.1.5 B2 Geotechnics

Although Route B2 takes a different alignment to Route B1 the geotechnical impacts and requirements are very similar. The ground conditions are generally superficial deposits, however there are areas of soft alluvial clay and gravelly alluvial deposits. The cut earthworks associated with the route are likely to intersect the basalt bedrock. No areas of possible contamination have been identified along this route.

North of Ballynure Water, there are no springs and rises in the vicinity of the alignment, however preliminary ground investigations indicated shallow groundwater. The groundwater

probably flows laterally within the fractured basalt bedrock. Drainage measures may be needed to mitigate the groundwater flow discharging into the cut earthworks which are more significant with Route B2 than B1.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 10.3.2.5.

10.3.1.6 B2 Construction Issues

The construction issues associated with Route B2 are the same as Route B1. The works are likely to result in some disruption to the existing A8 traffic during construction, and temporary speed limit A8 during the works would be required. The construction of Route B2 may also require the temporary closure of some of the existing side roads during the construction period.

The construction of Route B2 would require the import of additional material (approximately 300,000 cubic metres). It is assumed this additional fill material could be obtained from borrow pits on or adjacent to the site.

One of the new overbridges, STJ21 would be constructed on the line of the existing A8 and significant traffic management would make access to the works more difficult. The remaining structures would be constructed off-line making the construction process simpler.

10.3.2 B2 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

10.3.2.1 B2 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route B2 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would significantly increase by 73% and 56% in 2016 and 2031 respectively, and the PM_{10} emissions by 120% and 103% in 2016 and 2031 respectively, the same as route B1.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

10.3.2.2 B2 Cultural Heritage

There are ten known recorded local sites within the immediate vicinity of Route B2. The majority of these sites have been given general locations with their respective townlands by NIEA: Built Heritage, and there will be no impact on these sites. There are three recorded Industrial Heritage sites within the vicinity of Route B2. The proposed line of Route B2 crosses two sites, Hillis Bridge and Mearne's Bridge. Route B2 will pass over the Hillis Bridge site on a new structure and therefore will affect the setting of this site. The Mearne's Bridge site may be impacted, however no trace of this site was observed during a site visit.

An examination of aerial photographic evidence identified a cropmark feature very close to the route, and if the feature is archaeological in nature there is a potential impact. In addition, the footprint of this option will run through a large expanse of open land and there is a probability that ground works associated with this route will impact upon previously unrecorded deposits of archaeological potential.

The assessment of Route B1, based on the impact on one known sites and the potential impact to unknown archaeology, is that it would have a *Moderate Adverse* impact.

10.3.2.3 B2 Landscape

Route B2 passes through the same landscape as Route B1 and affects the same three LCAs. This route differs from Route B1 from the point where the alignment crosses Ballynure Water and Church Road. From this point the alignment takes a tighter arc around the village, avoiding intrusion into the Six Mile Water Landscape and passes close to several outlying properties north west of Ballynure. The assessment suggests that this route would have a *Moderate Adverse* effect on Landscape. The overall landscape effect should however be tempered with a slight beneficial effect on townscape within Ballynure.

Route B2 would visually affect the 'Ballynure River' Landscape Policy Area, and in the more expansive visual envelope would have a visual impact on views to and from the AONB. The wide visual effect may be slightly less pronounced that Route B1 by virtue of the route climbing the projecting ridge or valley slope in cutting. Although the route comes closer to Ballynure, localised visual impact would be minimised with appropriate mitigation planting. The proposed junction arrangements would however have a visual effect in the wider landscape. This route would have a *Slight Adverse* visual effect.

10.3.2.4 B2 Nature Conservation

Route B2 will have very similar impacts to Route B1. The principal habitats affected will include hedgerows, areas of scatted trees and four areas of marshy grassland, two of which are very small patches. However, the greater distance of Route B2 from the Six Mile Water, which is a key feature to the west of Ballynure, will lessen the impacts on protected species and riparian habitat The close proximity of the village to the route may however create more disturbance to potential bat roosts.

The possible presence of birds, badgers and salmonid species along the route could result in adverse impact on these species. The key concerns are the potential impacts to populations of otter and bats, in addition to the habitat loss. Overall Route B2 will have a Moderate *Adverse* effect.

10.3.2.5 B2 Materials

Route B2 is considered to have similar impacts as Route B1. Both routes cross an area where the superficial deposits are relatively thin and therefore many of the cut earthworks will intersect the basalt bedrock. In addition, cuttings associated with this route may intersect the flow of groundwater, which would require measures to prevent impacts to the flow.

The proposed route will not require as much fill material as Route B1, and will create cut material which can be used to form embankments and potentially utilised in other sections of the scheme. Therefore the overall affect on geology and materials is considered to be *Slight Adverse*

10.3.2.6 B2 Noise

The main noise impacts are similar to Route B1 with moderate and major adverse impacts on dwellings to the west of Ballynure between the A57 (Templepatrick Road) and Lismenary Road. However, dwellings in the centre of Ballynure and those along Castletown Road and Legaloy Road will be subject to major beneficial impact, as traffic is diverted along the new A8 alignment. Table 10.9 provides the results of the noise assessment for Route B2 in 2031.

Table 10.9: Route B2 Noise Assessment

Change in noise level (dB)	*Dwellings subject to change in noise level*		*Number of other sensitive receptors subject to a change in noise level*	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	2	2	1	1
0.1 – 0.9	77	23	0	0
1 – 2.9	147	42	0	1
3 – 4.9	122	25	1	0
5+	166	9	2	0
Total	**512**	**99**	**3**	**1**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

10.3.2.7 B2 Effects on all Travellers

Route B2 would be the same as Route B1 in relation to Effects on all Travellers. The scheme would improve the pedestrian and cyclists facilities, and safety within Ballynure. It would also provide more free flowing conditions, leading to improved journey times. In addition, it would include permanent and safe overtaking opportunities leading to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Moderate Beneficial*, the same as Route B1.

10.3.2.8 B2 Community and Private Assets

Route B2 is similar to Route B1 in relation to Community Assets. The route would not result in any direct impacts on community facilities within Ballynure and would reduce the current level of severance experienced in the village. The overall effect on Community Assets would be *Slight Beneficial*, the same as Route B1.

This route would require the demolition of one residential property and a further four residential properties would be impacted through some loss of gardens. In addition approximately 317 hectares of Grade 2 agricultural land would be lost to the scheme. Fifteen farm businesses have been identified which would endure an adverse impact on the management, performance and future viability. Five have been assessed to be significant adverse, three moderate adverse and seven slight adverse impacts. Ten further agricultural units were identified where the land is currently rented out. The overall effect of Route B2 on Private Assets would be *Moderate Adverse*.

10.3.2.9 B2 Road Drainage and the Water Environment

Route B2 crosses Green Burn, Ballynure Water and one other tributary. This route would also require a new structure across Ballynure Water, and the enlargement, replacement and/or extension of the culverts for the other watercourses. The principle impacts on these watercourses will be the same as Route B1 with potential for increased velocity and volume of road runoff, and the risk of pollution from road runoff during construction and operation.

Groundwater is known to lie close to the surface at various locations adjacent to the existing A8. Potential impacts to this resource may include alterations to natural drainage patterns due to the introduction of new road infrastructure. This route is located at a greater distance from the Six Mile Water than Route B1 reducing the potential impact on that watercourse.

The key impact for this route is the significant increase in impermeable surface and a new crossing of Ballynure Water. The impact on the water environment has been assessed to be *Slight Adverse*.

10.3.3 B2 Cost Estimate

The Stage 2 cost estimate for Route B2 is presented in Table 10.10, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 10.10: Route B2 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**31,843,630**
Contractors Overheads & Profit (10%)	£	3,184,363
Sub Total	**£**	**35,027,993**
Land Costs and Compensation	£	4,053,800
Preparation, surveys, design (9%)	£	3,152,519
Supervision (5%)	£	1,751,400
Contingency/Risk Allowance	£	1,500,680
Sub Total	**£**	**45,486,392**
Optimism Bias *(20% construction, 5% land and compensation)*	£	8,489,208
TOTAL ESTIMATED COST	**£**	**53,975,600**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£53,975,600**.

10.3.4 B2 Traffic Assessment

Route B2 has been represented by the Western Outer Bypass option in the traffic model (see section 5.3) and therefore has the same forecast flows as Route B1. The central growth traffic forecasts for Route B2 for the design year, 2031, are presented in Table 10.11 below.

Table 10.11: Route B2 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Do-Minimum without dual carriageway		Do-Something with Route B2	
	(Total 2-way AADT)	(*Total 2-way HGV AADT)*	*(Total 2-way AADT)*	(*Total 2-way HGV AADT)*
A8 (B95 Green Road to A57 Templepatrick Road)	16,005	1,920	17,126	1,883
New A8 (A57 Templepatrick Road to Ballybraken Road)	n/a	n/a	22,010	2,861
Original A8 (through Ballynure)	22,559	3,158	2,422	48
A57 Templepatrick Road	11,007	1,541	11,633	1,396
B58 Carrickfergus Road	4,489	584	5,101	510

10.3.5 B2 Economic Assessment

The economic assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme economics for each different route within Section B. Table 10.12 provides a summary of the economic performance, of the entire scheme, with Route B2. The full Transport Economic Efficiency tables are included in Appendix E.

Table 10.12: Route B2 Economic Assessment

Cost or Benefit	Value	Comments
Present Value of Benefits (PVB)	£118.9m	
Present Value of Costs (PVC)	£79.3m	
Net Present Value (NPV)	£39.6m	NPV = PVB – PVC
Benefit to Cost Ratio	1.50	BCR = PVB / PVC

It can be seen that the results of the economic assessment would indicate that Route B2 would be likely to deliver a benefit to cost ratio (BCR) of 1.50, with a net present value (NPV) of £39.6m.

10.4 Route B2, Inner South-western Bypass of Ballynure - WebTAG Appraisal

10.4.1 B2 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 10.3.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the Appraisal Summary Table (AST) in Section 10.4.7.

10.4.2 B2 Safety Objective

10.4.2.1 B2 Accidents Sub-Objective

The quantitative accident assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme accident statistics for each different route within Section B. Table 10.13 provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual carriageway with Route B2 adopted within Section B.

Table 10.13: Route B2 Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	9	18	-242	-215	-142	5,022
Accident Savings based on COBA rates	39	202	940	1,150	702	56,733

Table 10.13 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway would result in an increase in the number of slight injury accidents when compared to a do-minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that some slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single

carriageway, as demonstrated by the comparison against the COBA rates for a single carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route B2 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Route B2 would include two left-in left-out accesses serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Green Road Junction – the southbound left-off leads to a T-junction connection with the diverted B95 Calhame Road. There is a potential for a queue to form which would not be obvious to left turning southbound drivers on the A8, as visibility could be obstructed by a bridge abutment and embankment slopes. This could lead to rear-end shunt collisions.
- B95 Calhame Road – Sharp bend to turn back to the new junction. Possibility of excessive approach speed leading to loss of control.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed the during works. The major activities identified are:

- Construction of five new structures, two structures on the line of the existing A8;
- Construction work alongside existing utilities; and
- Traffic management associated with online widening over approximately 2.5km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route B2 involves the construction/replacement of five new structures and two culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

10.4.2.2 B2 Security Sub-Objective

Route B2 is similar to Route B1 and would provide improved footways and pedestrian facilities along the route, and remove the through traffic from Ballynure. However, based on the guidance in WebTAG Unit 3.4.2 and the low number of people using the facilities, the qualitative assessment score for this sub-objective would be *Neutral.*

10.4.3 B2 Economy Objective

The results of the economic assessment for Route B2, as outlined in Section 10.3.5 are presented in the Route B2 Appraisal Summary Table in Section 10.4.7, with the full Transport Economic Efficiency tables included in Appendix E.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route B2 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

10.4.4 B2 Accessibility Objective

10.4.4.1 B2 Option Values Sub-Objective

Route B2 is similar to Route B1 and would provide improved footways and pedestrian facilities along the route, and remove the through traffic from Ballynure. The qualitative assessment score for this sub-objective would be *Neutral.*

10.4.4.2 B2 Severance Sub-Objective

The assessment of Route B2 is the same as Route B1, see Section 10.2.4.2 for details. The impact on the severance sub-objective would be S*light Positive*.

10.4.4.3 B2 Access to the Transport System Sub-Objective

The qualitative assessment of this sub-objective would be *Neutral* for Route B2, the same as Route B1.

10.4.5 B2 Integration Objective

10.4.5.1 B2 The Transport Interchange Sub-Objective

The only transport interchanges identified within Section B are the existing bus stops along the A8 and in Ballynure. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

10.4.5.2 B2 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation and PPS 6 Planning, Archaeology and the Built Heritage, further design development will be required to mitigate or minimise impacts.

10.4.5.3 B2 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route B2 would be *Beneficial.*

10.4.6 B2 Supporting Analysis

10.4.6.1 B2 Affordability

The Route B2 scheme costs is reported in Section 10.3.3 with a total cost estimate of **£53,975,600** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

10.4.6.2 B2 Practicality

The Practicality of Route B2 is reported in the Section 10.3.1.6 of the DMRB engineering assessment.

10.4.6.3 B2 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. Route B2 is to the west of Ballynure, and within Sub-corridor B (as discussed in Section 6.4.1). The public response indicated there was no clear public preference for an eastern or western bypass of the village, and the further question asking members of the public to rank the Sub-Corridors in order of preference provided no clear preference.

10.4.7 B2 Appraisal Summary Table

The appraisal for Route B2 is summarised and presented in an AST, overleaf.

Table 10.14: Route B2 Appraisal Summary Table

Route B2, Inner South-western Bypass of Ballynure			**Problems:** Loss of one residential property and agricultural land and impact on landscape and biodiversity.	**Present value of costs to public:** £79.3 million*
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	Estimated Population Annoyed (Without Scheme): 39 Estimated Population Annoyed (With Scheme):57		Net Noise Annoyance: 18
	Local Air Quality	There are a total of 512 properties within 200m of the proposed route corridor. In both 2016 and 2031, 77 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 435 properties are predicted to experience an improvement.	The net change for NO_2 would be -568 for the assumed design year 2031, with -70 for PM_{10} and -63 for $PM_{2.5}$.	512 properties within 200m
	Greenhouse Gases	Change in Carbon Emissions over 60 year appraisal period (tonnes): 62,379*		£2.6m*
	Landscape	The route would impact upon the Three and Six Mile Water Valley Local Character Areas which has a distinct landscape and visual appeal that is highly legible and has distinct local cultural associations around Ballynure Water and recent industrial archaeology and land uses.		Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings. Where the route passes Ballynure there is potential slight adverse impact on setting for townscape and industrial landscape features of cultural significance.		Neutral
	Heritage/ Historic Resources	This route does not cross over the locations of any recorded archaeological sites. However, it does run through areas of greenfield that would have archaeological potential resulting in a potential slight adverse impact. This route crosses close to Hillis Bridge site IHR7 which dates to the early 19th Century. The bridge will not be lost due to the proposed scheme, however a new crossing will be constructed in close proximity to the existing bridge, impacting upon its setting.		Moderate Adverse
	Biodiversity	There are potential moderate adverse effects on protected species of birds and particularly bats and otters. New structures over Ballynure water and other small water courses will result in slight localised loss of riparian habitats and temporary disturbance to species during construction. Loss of field boundaries, improved grassland and low quality marshy grassland may also occur.		Moderate Adverse
	Water Environment	The route crosses the Green Burn, Ballynure Water and other minor watercourses. The route will require a new structure across Ballynure Water resulting in a slight adverse impact, and the enlargement, replacement and/or extension of the other culverts carrying the watercourse beneath the A8.		Slight Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians. Removing through traffic from the settlement of Ballynure would increase pedestrian and cyclist safety, activity and connectivity with community facilities.		Moderate Beneficial
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8 and alleviation of traffic congestion. Improvement to junctions would reduce driver stress for local and through traffic. All these factors would contribute to an enhanced driving experience		Moderate Beneficial

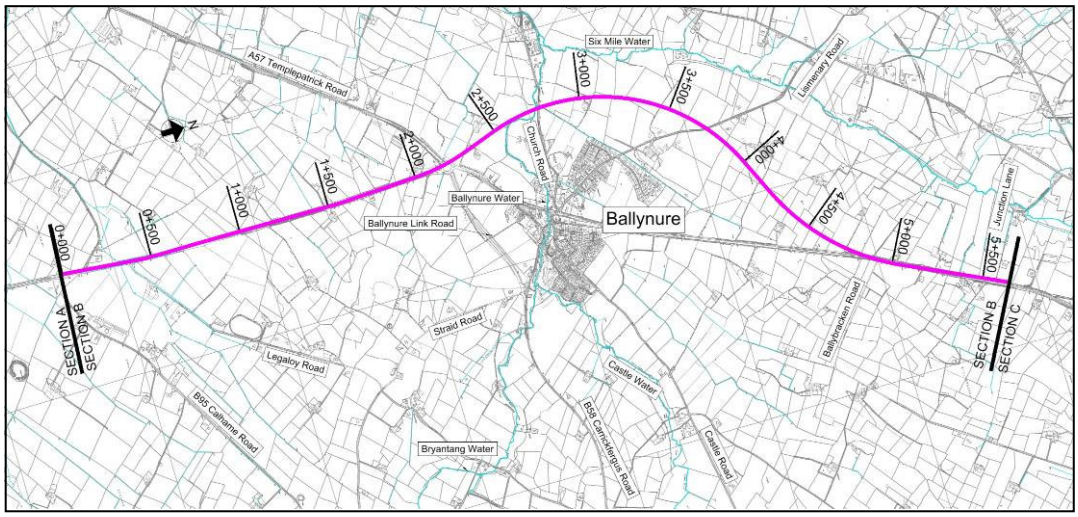
		along this section of the A8, and an improved driving experience within Ballynure village.		
Safety	Accidents	Improvement on existing single carriageway. 2 No. left-in left-out access, tight radius bend on Calhame Road and T-junction on Green Road were identified by a Road Safety Auditor as potential safety hazards.	Accident Benefits = £5.0m*	Slight Beneficial
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		Central Government PVC = £ 79.3 million*	PVC = £79.3m*
	Transport Economic Efficiency: Business Users		Business Users PVB = £78.7 million*	PVB = £78.7m*
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £37.8 million*	PVB = £ 37.8m*
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Ballynure would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2 and PPS 6.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

* Figures calculated for the whole scheme with constant routes within Section A and C

10.5 Route B3, Inner North-western Bypass of Ballynure – DMRB Assessment

Route B3 would provide an inner bypass to the west of Ballynure. It would stay on the line of the existing A8 until the existing A57 (Templepatrick Road) roundabout. The route would then head northwest.

Figure 10.3: Route B3 Plan



10.5.1 B3 Engineering Assessment

10.5.1.1 B3 Geometric Assessment

The Route B3 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

The junction strategy was previously discussed in Section 5.5, which outlined that compact grade separated junctions would be provided at Green Road/ Calhame Road/ Legaloy Road and Ballybraken Road, with a new full grade separated junction provided at the A57 Templepatrick Road. Church Road and Lismenary Road would be maintained with a connection across the scheme, but with no connection to the new dual carriageway.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junction at Green Road/ Calhame Road/ Legaloy Road will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting Calhame Road into the junction.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

10.5.1.2 B3 Structures

Route B3 would require five new structures:

- STJ21 – Green Road/ Calhame Road/ Legaloy Road Junction Overbidge;
- STJ22 – A57 Templepatrick Road/ B58 Carrickfergus Road Junction Overbridge;
- STW02/STR41 – Ballynure Water and Church Road Underbridge;
- STR42 – Lismenary Road Overbridge; and
- STJ23 – Ballybraken Road Junction Overbridge.

Geometrically, all five structures would be relatively simple with the four overbridges having reasonable straight alignments. The structures will generally have perpendicular crossings with the exception of STR42 which will have a slight skew.

STJ22, would be constructed over the existing A57 (Templepatrick Road) roundabout and will require complex traffic management and construction phasing to build the bridge whilst maintaining traffic flows on the A8, A57 Templepatrick Road and B58 Carrickfergus Road. STJ21 and STJ23 would be constructed on the line of the existing route and would require more significant traffic management and make access to the works more difficult.

STW02/STR41 will be constructed over Ballynure Water and Church Road and it may be appropriate to close Church Road temporally during the works to simplify the construction of this bridge.

10.5.1.3 B3 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route B3 is the same as B1 and confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. It would also require a total of two culverts and one bridge (refer to Section 10.5.1.2), the same as Route B1. Route B3 would also require a diversion of the Ballynure Water, which is discussed in more detail in the environmental assessment, Section 10.5.2.9.

10.5.1.4 B3 Utility Services

Route B3 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water, Bord Gais Networks and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 10.15 below.

Table 10.15: Route B3 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Ballynure.	321,000
Northern Ireland Water	Diversions of watermains and sewers along the A8, and the watermain crossing the route adjacent to Lismenary Road.	357,400
Bord Gais Networks	Diversion/protection of gas main south of Ballybraken Road.	1,106,310
BT	Diversion of overhead and underground BT lines crossing the route at various points.	385,420
	Total Costs	**2,170,130**

Route B3 would have similar impacts to Routes B1 and B2, with impacts on the existing utilities mainly on the online sections, with other impacts on the off-line sections where the route crosses utilities. The main impact would be on the high pressure gas main to the north of Ballynure, watermains along the A8 and the overhead electricity cables (110kv) which cross the scheme just north of the Ballybraken Road.

10.5.1.5 B3 Geotechnics

The geotechnical aspects of Route B3 are the same as Route B2. The ground conditions are generally superficial deposits, however there are areas of soft alluvial clay and gravelly alluvial deposits. Cut earthworks associated with the route are likely to intersect the basalt bedrock and no areas of possible contamination have been identified along this route. Drainage measures may be required to mitigate the groundwater flow discharging into the cut earthworks.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 10.5.2.5.

10.5.1.6 B3 Construction Issues

The construction issues associated with Route B3 are broadly same as Route B1. The works are likely to result in some disruption to the existing A8 traffic during construction, and temporary speed limit on the A8 during the works would be required. The construction of Route B3 may also require the temporary closure of some of the existing side roads during the construction period. However, in addition to the issues outlined for Routes B1 and B2, this route would upgrade the existing A8 through the existing A57 (Templepatrick Road) roundabout. A new full grade separated junction would be provided at this point and the construction of this new junction while maintaining traffic flows through the existing junction will require complex traffic management.

The construction of Route B3 would require the import of additional fill material which could be obtained from borrow pits on or adjacent to the site.

The construction of three structures will be on the line of the existing A8 which will require significant traffic management and make access to the works more difficult. The most complex structure to build will be STJ22 at the A57 (Templepatrick Road). STJ21 would be constructed on the line of the existing route. This would require more significant traffic management and make access to the works more difficult. The remaining structures would be constructed off-line making the construction process simpler.

10.5.2 B3 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

10.5.2.1 B3 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route B3 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would significantly increase by 73% and 56% in 2016 and 2031 respectively, and the PM_{10} emissions by 120% and 103% in 2016 and 2031 respectively, the same as Routes B1 and B2.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

10.5.2.2 B3 Cultural Heritage

There are ten known recorded local sites within the immediate vicinity of Route B3. The majority of these sites have been given general locations with their respective townlands, Route B3 will have no impact on these sites. There are four recorded Industrial Heritage sites within the vicinity of Route B3. The only site which may be impacted is Mearne's Bridge, which is crossed by Route B3, however no trace of this site was observed during a site visit.

Similar to Routes B1 and B2, the footprint of this route will run through a large expanse of open land and there is a probability that ground works associated with this route will impact upon previously unrecorded deposits of archaeological potential.

The assessment of Route B3, based on the potential impact to unknown archaeology, is that it would have a *Slight Adverse* impact.

10.5.2.3 B3 Landscape

Route B3 passes through the same landscape as Route B1 and B2 and affects the same three LCAs. This route avoids an area of high ground immediately south of the A57

(Templepatrick Road) before heading downhill across agricultural land. The route directly affects the Ballynure Water, and the mature hedgerows along it where the section of river is to be realigned. The assessment suggests that this route would have a *Moderate Adverse* effect on Landscape. The overall landscape effect should however be tempered with a slight beneficial effect on townscape within Ballynure.

Route B3 avoids the visual effects of Route B1 and B2 to the southwest of Ballynure by remaining on the existing A8, however there would still be a broad visual affect across the Six Mile Water valley. However, it would visually affect the 'Ballynure River' Landscape Policy Area, and in the more expansive visual envelope would have a visual impact on views to and from the AONB. There would be localised visual impact on properties on the western edge of Ballynure and discrete farmhouses. The proposed junction arrangements would however have a visual effect in the wider landscape. This route would have a *Moderate Adverse* visual effect.

10.5.2.4 B3 Nature Conservation

Route B3 will impact on the same principal habitats as Route B1 and B2, including hedgerows, areas of scattered trees and four areas of marshy grassland, two of which are very small patches. In addition to this there will be a substantial impact to Ballynure Water, which is designated as a local nature area at this point, and its associated riparian and aquatic habitats with the realignment of approximately 100m of the river.

The impact on other protected species is considered to be similar to Route B1 and B2, although the realignment of Ballynure Water would increase the impact on otters and protected species of fish if they are using Ballynure Water.

The principle impact of this route will be the realignment of Ballynure Water which will have an impact on riparian and aquatic habitat, and impact on otter if they are using this river corridor. There will be limited opportunities to mitigate these impacts. Overall Route B3 will have a *Large Adverse* effect.

10.5.2.5 B3 Materials

Route B3 is considered to have similar impacts to Route B1 and B2. All three routes cross an area where the superficial deposits are relatively thin and therefore many of the cut earthworks will intersect the basalt bedrock. In addition, cuttings associated with this route may intersect the flow of groundwater, which would require measures to prevent impacts to the flow.

The balance of fill and cut material for Route B3 will be similar to Route B2 and therefore the overall affect on geology and materials is considered to be *Slight Adverse*

10.5.2.6 B3 Noise

Route B3 follows a similar alignment to Route B3. The main noise impacts would be on dwellings along Church Road and houses to the west of Lismenary Road which would be subject to moderate and major adverse impacts. Dwellings in the centre of Ballynure and those along Castletown Road and Legaloy Road will be subject to major beneficial impact, as traffic is diverted along the new A8 alignment. Table 10.16 provides the results of the noise assessment for Route B3 in 2031.

Table 10.16: Route B3 Noise Assessment

Change in noise level (dB)	*Dwellings subject to change in noise level*		*Number of other sensitive receptors subject to a change in noise level*	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	2	2	1	1
0.1 – 0.9	77	23	0	0
1 – 2.9	147	42	0	1
3 – 4.9	122	25	1	0
5+	167	9	2	0
Total	**513**	**99**	**3**	**1**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

10.5.2.7 B3 Effects on all Travellers

Route B3 would be the same as Route B1 and B2 in relation to Effects on all Travellers. The scheme would improve the pedestrian and cyclists facilities, and safety within Ballynure. It would also provide more free flowing conditions, leading to improved journey times. In addition it would include permanent and safe overtaking opportunities leading to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Moderate Beneficial*, the same as Route B1 and B2.

10.5.2.8 B3 Community and Private Assets

Route B3 is similar to Route B1 in relation to Community Assets. The route would not result in any direct impacts on community facilities within Ballynure and would reduce the current level of severance experienced in the village. The overall effect on Community Assets would be *Slight Beneficial*, the same as Route B1.

This route would require the demolition of one residential property and a further four residential properties would be impacted through some loss of gardens. In addition approximately 253 hectares of Grade 2 agricultural land would be lost to the scheme. Eighteen farm businesses have been identified which would endure an adverse impact on the management, performance and future viability. Five have been assessed to be significant adverse, four moderate adverse and nine slight adverse impacts. Ten further agricultural units were identified where the land is currently rented out. The overall effect of Route B3 on Private Assets would be *Moderate Adverse*.

10.5.2.9 B3 Road Drainage and the Water Environment

This route crosses Green Burn, Ballynure Water and one other tributary, however will require the realignment of approximately 100m of the Ballynure Water. Part of Ballynure Water adjacent to the route is a local nature area and designated as a salmonid water. This route would also require a new structure across Ballynure Water, and the enlargement, replacement and/or extension of the culverts for the other watercourses. The principle impacts on these watercourses will be the same as Route B1 and B2, with potential for increased velocity and volume of road runoff, and the risk of pollution from road runoff during construction and operation.

Groundwater is known to lie close to the surface at various locations adjacent to the existing A8. Potential impacts to this resource may include alterations to natural drainage patterns due to the introduction of new road infrastructure.

The key impact for this route is the realignment of Ballynure Water. This would be a permanent impact and would give rise to a *Moderate Adverse* impact.

10.5.3 B3 Cost Estimate

The Stage 2 cost estimate for Route B3 is presented in Table 10.17, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 10.17: Route B3 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**32,799,192**
Contractors Overheads & Profit	£	3,279,919
Sub Total	**£**	**36,079,111**
Land Costs and Compensation	£	3,708,200
Preparation, surveys, design	£	3,247,120
Supervision	£	1,803,956
Contingency/Risk Allowance	£	1,479,945
Sub Total	**£**	**46,318,332**
Optimism Bias *(21% construction, 5% land and compensation)*	£	8,707,436
TOTAL ESTIMATED COST	**£**	**55,024,768**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£55,024,768**.

10.5.4 B3 Traffic Assessment

Route B3 has been represented by the Western Outer Bypass option in the traffic model (see Section 5.3) and therefore has the same forecast flows as Route B1 and B2. The central growth traffic forecasts for Route B3 for the design year, 2031, are presented in Table 10.18 below.

Table 10.18: Route B3 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Do-Minimum without dual carriageway		Do-Something with Route B3	
	(Total 2-way AADT)	(*Total 2-way HGV AADT)*	*(Total 2-way AADT)*	(*Total 2-way HGV AADT)*
A8 (B95 Green Road to A57 Templepatrick Road)	16,005	1,920	17,126	1,883
New A8 (A57 Templepatrick Road to Ballybraken Road)	n/a	n/a	22,010	2,861
Original A8 (through Ballynure)	22,559	3,158	2,422	48
A57 Templepatrick Road	11,007	1,541	11,633	1,396
B58 Carrickfergus Road	4,489	584	5,101	510

10.5.5 B3 Economic Assessment

The economic assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme economics for each different route within Section B. Table 10.19 provides a summary of the economic performance, of the entire scheme, with Route B3. The full Transport Economic Efficiency tables are included in Appendix E.

Table 10.19: Route B3 Economic Assessment

Cost or Benefit	Value	Comments
Present Value of Benefits (PVB)	£118.9m	
Present Value of Costs (PVC)	£80.2m	
Net Present Value (NPV)	£38.7m	NPV = PVB – PVC
Benefit to Cost Ratio	1.48	BCR = PVB / PVC

It can be seen that the results of the economic assessment would indicate that Route B3 would be likely to deliver a benefit to cost ratio (BCR) of 1.48, with a net present value (NPV) of £38.7m.

10.6 Route B3, Inner North-western Bypass of Ballynure - WebTAG Appraisal

10.6.1 B3 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 10.5.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the AST in Section 10.6.7.

10.6.2 B3 Safety Objective

10.6.2.1 B3 Accidents Sub-Objective

The quantitative accident assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme accident statistics for each different route within Section B. Table 10.20 provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual carriageway with Route B3 adopted within Section B.

Table 10.20: Route B3 Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	9	18	-242	-215	-142	5,022
Accident Savings based on COBA rates	39	202	940	1,150	702	56,733

Table 10.20 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway would result in an increase in the number of slight injury accidents when compared to a do-minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that some slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single

carriageway, as demonstrated by the comparison against the COBA rates for a single carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route B3 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Route B3 would include four left-in left-out access serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Green Road Junction – the southbound left-off leads to a T-junction connection with the diverted B95 Calhame Road. There is a potential for a queue to form which would not be obvious to left turning southbound drivers on the A8, as visibility could be obstructed by a bridge abutment and embankment slopes. This could lead to rear-end shunt collisions.
- B95 Calhame Road – Sharp bend to turn back to the new junction. Possibility of excessive approach speed leading to loss of control.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during the works. The major activities identified are:

- Construction of five new structures, two structures on the line of the existing A8;
- Construction of new fully grade separated junction in the immediate vicinity of the existing A8/A57 roundabout;
- Construction work alongside existing utilities; and
- Traffic management associated with online widening over approximately 2.75km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route B3 involves the construction/replacement of five new structures and two culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

10.6.2.2 B3 Security Sub-Objective

Route B3 is similar to Route B1 and would provide improved footways and pedestrian facilities along the route, and remove the through traffic from Ballynure. The qualitative assessment score for this sub-objective would be *Neutral.*

10.6.3 B3 Economy Objective

The results of the economic assessment for Route B3, as outlined in Section 10.5.5 are presented in the Route B3 Appraisal Summary Table in Section 10.6.7, with the full Transport Economic Efficiency tables included in Appendix E.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route B3 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

10.6.4 B3 Accessibility Objective

10.6.4.1 B3 Option Values Sub-Objective

The qualitative assessment of Route B3 would be the same as Route B1 and would be *Neutral*. The public transport provision on Route B3 and within Ballynure would be similar to the existing, with existing bus stops in Ballynure retained.

10.6.4.2 B3 Severance Sub-Objective

The assessment of Route B3 is the same as Route B1, see Section 10.2.4.2 for details. The impact on the severance sub-objective would be S*light Positive*.

10.6.4.3 B3 Access to the Transport System Sub-Objective

The qualitative assessment of this sub-objective would be *Neutral* for Route B3, the same as Route B1. The public transport provision will be similar to the existing, with existing bus stops in Ballynure retained. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low.

10.6.5 B3 Integration Objective

10.6.5.1 B3 The Transport Interchange Sub-Objective

The only transport interchanges identified within Section B are the existing bus stops along the A8 and in Ballynure. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

10.6.5.2 B3 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation, further design development will be required to mitigate or minimise impacts.

10.6.5.3 B3 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route B3 would be *Beneficial.*

10.6.6 B3 Supporting Analysis

10.6.6.1 B3 Affordability

The Route B3 scheme costs is reported in Section 10.5.3 with a total cost estimate of **£55,025,768** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of wider Strategic Road Improvements programme.

10.6.6.2 B3 Practicality

The Practicality of Route B3 is reported in the Section 10.5.1.6 of the engineering assessment.

10.6.6.3 B3 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. Route B3 is to the west of Ballynure, and within Sub-corridor B (as discussed in Section 6.4.1).

The public response indicated there was no clear public preference for an eastern or western bypass of the village, and the further question asking members of the public to rank the Sub-Corridors in order of preference provided no clear preference.

10.6.7 B3 Appraisal Summary Table

The appraisal for Route B3 is summarised and presented in an AST, overleaf.

Table 10.21: Route B3 Appraisal Summary Table

Route B3, Inner North-western Bypass of Ballynure				**Problems:** Ballynure Water Diversion loss of agricultural land, and impact on landscape and biodiversity.	**Present value of costs to public:** £80.2 million*
Objective	***Sub-Objective***	***Qualitative Impacts***		***Quantitative Assessment***	***Assessment***
Environment	Noise		Estimated Population Annoyed (Without Scheme): 40 Estimated Population Annoyed (With Scheme):58		Net Noise Annoyance: 18
	Local Air Quality	There are a total of 512 properties within 200m of the proposed route corridor. In both 2016 and 2031, 77 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 435 properties are predicted to experience an improvement.		The net change for NO_2 would be -549 for 2031, with -66 for PM_{10} and -59 for $PM_{2.5}$.	512 properties within 200m
	Greenhouse Gases		Change in Carbon Emissions over 60 year appraisal period (tonnes): 62,379*		£2.6m*
	Landscape	The route would impact upon the Three and Six Mile Water Valley Local Character Areas which has a distinct landscape and visual appeal that is highly legible and has distinct local cultural associations around Ballynure Water and recent industrial archaeology and land uses resulting in a slight adverse impact to the cultural landscape.			Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings and on existing dwellings on the periphery of the village. Where the route passes Ballynure there is potential slight adverse impact on setting for townscape and industrial landscape features of cultural significance.			Neutral
	Heritage/ Historic Resources	This route crosses one Industrial Heritage site, however no trace of the site was observed during a site visit. In addition, it runs through areas of greenfield that would have subsurface archaeological potential.			Slight Adverse
	Biodiversity	The principle impacts are the potential adverse effects on protected species, in particularly otters and bats. Loss of field boundaries, improved grassland and low quality marshy grassland may also occur. Alteration and realignment to a 100m section of Ballynure Water and loss of associated habitats will have a large adverse impact upon the area of Ballynure Water, identified as a local nature area.			Large Adverse
	Water Environment	The route crosses the Green Burn, Ballynure Water and two other tributaries. The route would however require the diversion of approximately 100m of the Ballynure Water resulting in a large adverse impact to the existing surface water feature and localised groundwater flows. The route will require new crossings of Ballynure Water, and the enlargement, replacement and/or extension of the other culverts carrying the watercourse beneath the A8.			Large Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclists. Removing through traffic from the settlement of Ballynure would increase pedestrian and cyclist safety, activity and connectivity with community facilities.			Moderate Beneficial
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak times. All these factors would			Moderate

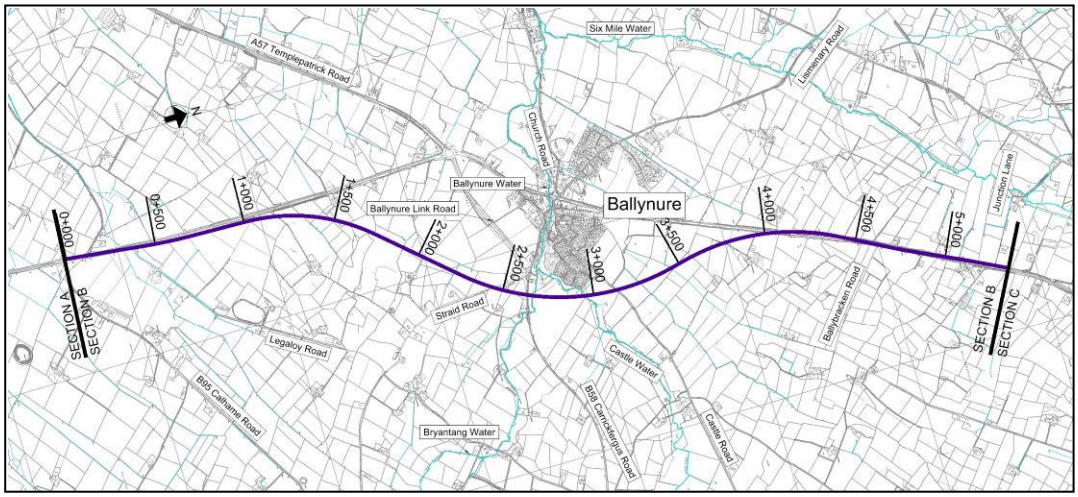
		contribute to an enhanced driving experience along this section of the A8, and an improved driving experience within Ballynure village.		Beneficial
Safety	Accidents	Improvement on existing single carriageway. 2 No. left-in left-out access, tight radius bend on Calhame Road and T-junction on Green Road were identified by a Road Safety Auditor as potential safety hazards.	Accident Benefits = £5.0m*	Slight Beneficial
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		Central Government PVC = £ 80.2m*	PVC = £80.2m*
	Transport Economic Efficiency: Business Users		Business Users PVB = £78.7 million*	PVB = £78.7m*
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £37.8 million*	PVB = £ 37.8m*
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Ballynure would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

* Figures calculated for the whole scheme with constant routes within Section A and C

10.7 Route B4, Inner Eastern Bypass of Ballynure – DMRB Assessment

Route B4 would provide an inner bypass to the east of Ballynure leaving the existing corridor just to north of Legaloy Road. The route would then head northeast, before coming tight to the edge of Ballynure, and rejoining the existing A8 500m before Ballybraken Road.

Figure 10.4: Route B4 Plan



10.7.1 B4 Engineering Assessment

10.7.1.1 B4 Geometric Assessment

The Route B4 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

The junction strategy was previously discussed in Section 5.5, which outlined that compact grade separated junctions would be provided at Green Road/ Calhame Road/ Legaloy Road and Ballybraken Road, with a new full grade separated junction provided at the B58 (Carrickfergus Road). Straid Road and Castle Road would be maintained with a connection across the scheme, but with no connection to the new dual carriageway.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junction at Green Road/ Calhame Road/ Legaloy Road will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting Calhame Road into the junction. In addition, a Departure will be required for the horizontal radii connecting the new link road back into the Straid Road.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

10.7.1.2 B4 Structures

Route B4 would require six new structures:

- STJ21 – Green Road/ Calhame Road/ Legaloy Road Junction Overbidge;
- STJ22 – A57 Templepatrick Road/ B58 Carrickfergus Road Junction Overbridge;
- STW03 – Bryantang Water Underbridge;
- STW04 – Castle Water Underbridge
- STR44 – Castle Road Overbridge; and
- STJ23 – Ballybraken Road Junction Overbridge.

Geometrically, all six structures would be relatively simple with the four overbridges having reasonable straight alignments. The structures will generally have perpendicular crossings with the exception of STR44 which will have a slight skew.

STJ21 and STJ23 would be constructed on the line of the existing route and would require more significant traffic management and make access to the works more difficult. STJ22, would be constructed just off-line of the existing B58 (Carrickfergus Road), however there is limited space and varying levels in the immediate area making construction phasing and access to the works more difficult.

STR44 will be constructed on the line of Castle Road and it will be necessary to close Castle Road temporarily or construct a temporary parallel diversion during the construction works.

10.7.1.3 B4 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route B4 confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. However, to achieve adequate fall between the road level and the watercourse, some of the online sections of the proposed dual carriageway need to be raised above the existing road level. For the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

Cross drainage was modelled using the 1-in-100 year flows for the various catchments with an additional flow of 20% to account for climate change, and culvert sizes were calculated using these flows. For Route B4, there would be a total of two culverts and two bridges (refer to Section 10.7.1.2). The deepest culvert was for the Green Burn which would be 2100mm deep.

10.7.1.4 B4 Utility Services

Route B4 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water, Bord Gais Networks and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 10.22 below.

Table 10.22: Route B4 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Ballynure.	253,00
Northern Ireland Water	Diversions of watermains and sewers along the A8, and the watermain crossing the route adjacent to Castle Road.	371,910
Bord Gais Networks	Diversion/protection of gas main south of Ballybraken Road.	1,106,310
BT	Diversion of overhead and underground BT lines crossing the route at various points.	227,900
	Total Costs	**£1,959,120**

Route B4 would have similar impacts to Routes B1 and B2, with impacts on the existing utilities mainly on the online sections, with other impacts on the off-line sections where the route crosses utilities. The main impact would be on the high pressure gas main to the north of Ballynure, watermains along the A8 and the overhead electricity cables (110kv) which cross the scheme just north of the Ballybraken Road.

10.7.1.5 B4 Geotechnics

Route B4 is a mixture of widening the existing road and off-line construction. The ground conditions are generally superficial deposits, which are thin and locally absent in areas. Alluvial deposits will be present where the alignment crosses the Ballynure Water valley bottom, and it may be necessary to dig out and replace some of this material. The cut earthworks associated with Route B4 are likely to intersect the basalt bedrock which is relatively shallow. No areas of possible contamination have been identified along this route.

The preliminary ground investigations indicated shallow groundwater to the south and north of Ballynure Water. The shallow groundwater may require drainage measures during construction to stop groundwater discharging into excavations.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 10.7.2.5.

10.7.1.6 B4 Construction Issues

The construction issues associated with Route B4 are broadly same as Route B1. The works are likely to result in some disruption to the existing A8 traffic during construction, and a temporary speed limit on the A8 during the works would be required. The construction of Route B4 may also require the temporary closure of some of the existing side roads during the construction period.

The construction of Route B4 would require the import of additional fill material which could be obtained from borrow pits on or adjacent to the site.

The construction of two structures (STJ21 and STJ23) will be on the line of the existing A8 which will require significant traffic management and make access to the works more difficult. The most complex structure to build will be STJ22 at the B58 (Carrickfergus Road) because of the proximity of the structure to the existing road, residential properties and Bryantang Water. The remaining structures would be constructed off-line making the construction process simpler.

10.7.2 B4 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

10.7.2.1 B4 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route B4 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would significantly increase by 54% and 57% in 2016 and 2031 respectively, and the PM_{10} emissions by 102% and 146% in 2016 and 2031 respectively.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

10.7.2.2 B4 Cultural Heritage

There are nine known recorded local sites within the immediate vicinity of Route B4, five of these sites will not be impacted by the route. Two of these sites (a possible enclosure and a Holy Well) lie within the footprint of the route. A site visit however revealed the potential enclosure is possibly a natural feature. The exact locations of the two remaining sites are not known and it is possible the route may impact upon these sites. There are four recorded Industrial Heritage sites within the vicinity of Route B4. The only site which may be impacted

is Mearne's Bridge, which is crossed by Route B4, however no trace of this site was observed during a site visit.

The footprint of this route will run through a large expanse of open land and therefore will impact upon previously unrecorded deposits of archaeological potential.

The assessment of Route B4, based on possible impact to four known archaeological sites, one industrial heritage sites and the potential impact to unknown archaeology, is that it would have a *Moderate Adverse* impact.

10.7.2.3 B4 Landscape

The area to the east of Ballynure crossed by Route B4 lies within the Tardee and Six Mile Water Slopes LCA for the majority of the route. It is characterised by a gently undulating 'plateau' which is dissected by the two rivers Bryantang Water and Castle Water. The narrowly incised valleys cut by these watercourses are distinguishable in the wider landscape by the clustering of scrub woodland and trees. The wider landscape context here is generally low to medium sensitivity.

Route B4 would traverse these narrow river valleys on low embankment with bridge/culvert structures. Any fragmentation of fields will be less severe due to the field sizes being untypically larger close to the eastern edge of Ballynure. At the southern and northern ends of the route, although the field sizes reduce and hedgerow cover increases which could result in a greater impact, the alignment works with the contour of the landscape to minimise the impact. The assessment suggests that this route would have a *Moderate Adverse* effect on Landscape. The overall landscape effect should however be tempered with a slight beneficial effect on townscape within Ballynure.

The predominant visual effect of this alignment will be on individual dispersed properties, but also potentially westwards on houses on the edge of Ballynure. The subtle variations in the topography in conjunction with hedgerows and trees would assist in filtering views of the road. Views east across the wide landscape would be contained by the undulating and higher ground. The overall visual effect on properties and on receptors would be *Moderate Adverse.*

10.7.2.4 B4 Nature Conservation

There are no statutory or non-statutory designated sites within, or adjacent to this route. The principal habitats affected include field boundaries such as hedgerows, extensive areas of improved grasslands, areas of scattered trees and a small linear section of broadleaved woodland lining the bank of Castle Water.

The off-line section of this route crosses three watercourses suitable for otters, in particular Castle Water and Bryantang Water were both noted to have considerable potential to be used by otter. In an area of marshy grassland on the northern bank of Castle Water an otter pathway was observed during the surveys. The impact on the otter population, if present, may include the loss of holts or resting places and disturbance caused by noise, dust and disruption. There are a number of buildings within close proximity to this route which could support bat roosts, and there are the potential effects on bats from loss of foraging areas and disruption of flight lines, especially with the off-line sections. There are areas of suitable habitat for badgers and they may suffer impact in the form of restricted movement, habitat loss and road mortalities. No protected species were identified during the surveys; however CEDaR records show the Red Kites (an NI Species of Conservation Concern) have been identified at Ballynure. These records also confirmed two watercourses in the vicinity of the proposed route contain salmonid species.

Principle impacts will include areas of habitat loss and additional places of impact at river crossings. The possible presence of badgers, birds and salmonid species along the route could result in adverse impacts on these species. However, appropriate mitigation may

adequately address these issues. Key concerns are the potential impacts to populations of bats and otters. Overall Route B4 will have a *Moderate Adverse* effect.

10.7.2.5 B4 Materials

The alignment of Route B4 crosses an area where the superficial deposits are relatively thin and locally absent. Therefore, many of the cut earthworks will intersect the basalt bedrock. Some made ground will be present associated with the existing A8 at the north and south of the route, however there is not anticipated to be any contaminated land along this route.

South of the Ballynure Water there are several springs and rises in the vicinity of the route, which indicate the groundwater is close to the surface. North east of Ballynure the route will cross an isolated spring, where locally high groundwater can be expected.

The proposed route will create a significant amount of cut material during the ground works, although the majority of this material will be used in the proposed embankments. Therefore the overall affect on geology and materials is considered to be *Slight Adverse*.

10.7.2.6 B4 Noise

Route B4 diverts east from the existing A8 leading to a major adverse impact on dwellings around Straid Road and south of Carrickfergus Road. The majority of dwellings in the east of Ballynure, and those along Castle Road and at Shannonstown may also be subject to a major noise impact. Dwellings along Church Road are also predicted to be subject to minor adverse impacts. However, dwellings in the centre of Ballynure and along Lismenary Road will be subject to moderate and major beneficial impact. Table 10.23 provides the results of the noise assessment for Route B4 in 2031.

Table 10.23: Route B4 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	3	3	0	0
0.1 – 0.9	116	38	1	0
1 – 2.9	179	25	2	0
3 – 4.9	101	5	2	0
5+	150	4	0	0
Total	**546**	**72**	**5**	**0**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

10.7.2.7 B4 Effects on all Travellers

The overall scheme proposals would improve the existing facilities for pedestrians and cyclists, affording safe provision along the carriageway between facilities. Route B4 would remove the A8 from Ballynure reducing the traffic levels through the village and increasing pedestrian and cyclist safety.

Route B4 would provide an important route for vehicle travellers, with a dual carriageway providing more free flowing conditions. Improvements in travel times and the inclusion of a permanent, safe overtaking opportunity would lead to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Moderate Beneficial*.

10.7.2.8 B4 Community and Private Assets

Route B4 is similar to Route B1 in relation to Community Assets. The route would not result in any direct impacts on community facilities within Ballynure and would reduce the current level of severance experienced in the village. The overall effect on Community Assets would be *Slight Beneficial*, the same as Route B1.

This route would require the demolition of one residential properties and a further three residential properties would be impacted through some loss of gardens. In addition approximately 266 hectares of Grade 2 agricultural land would be lost to the scheme. Fourteen farm businesses have been identified which would endure an adverse impact on the management, performance and future viability. Four have been assessed to be significant adverse, three moderate adverse and seven slight adverse impacts. Eight further agricultural units were identified where the land is currently rented out. The overall effect of Route B4 on Private Assets would be *Moderate Adverse*.

10.7.2.9 B4 Road Drainage and the Water Environment

Route B4 crosses Green Burn, Bryantang Water, Castle Water and one other tributary. This route would require new structures across Bryantang Water and Castle Water, and the enlargement, replacement and/or extension of the culverts for the other watercourses. The principle impacts on these watercourses will be the potential for increased velocity and volume of road runoff, and the risk of pollution from road runoff during construction and operation.

Groundwater is known to lie close to the surface at various locations adjacent to the existing A8. Potential impacts to this resource may include alterations to natural drainage patterns due to the introduction of new road infrastructure. The floodplains are rather narrow at the point where the route crosses the watercourses, and therefore only crosses approximately 60m of floodplain.

The key impact for this route is the significant increase in impermeable surface and new crossings of Bryantang Water and Castle Water. The impact on the water environment has been assessed to be a *Slight Adverse*.

10.7.3 B4 Cost Estimate

The Stage 2 cost estimate for Route B4 is presented in Table 10.24, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 10.24: Route B4 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**29,228,225**
Contractors Overheads & Profit	£	2,922,822
Sub Total	**£**	**32,151,047**
Land Costs and Compensation	£	4,079,720
Preparation, surveys, design	£	2,893,594
Supervision	£	1,607,552
Contingency/Risk Allowance	£	995,280
Sub Total	**£**	**41,727,194**
Optimism Bias *(21% construction, 5% land and compensation)*	£	7,733,481
TOTAL ESTIMATED COST	**£**	**49,460,675**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£49,460,675**.

10.7.4 B4 Traffic Assessment

Route B4 has been represented by the Eastern Inner Bypass option in the traffic model (see Section 5.3). The central growth traffic forecasts for Route B4 for the design year, 2031, are presented in Table 10.25 below.

Table 10.25: Route B4 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Do-Minimum without dual carriageway		Do-Something with Route B4	
	(Total 2-way AADT)	*(Total 2-way HGV AADT)*	*(Total 2-way AADT)*	*(Total 2-way HGV AADT)*
New A8 (B95 Green Road to A57 Templepatrick Road)	n/a	n/a	16,493	1,979
New A8 (A57 Templepatrick Road to Ballybraken Road)	n/a	n/a	20,525	2,258
Original A8 (B95 Green Road to A57 Templepatrick Road)	16,005	1,920	860	17
Original A8 (through Ballynure)	22,559	3,158	3,123	718
A57 Templepatrick Road	11,007	1,541	10,641	1,490
B58 Carrickfergus Road	4,489	584	5,317	479

10.7.5 B4 Economic Assessment

The economic assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme economics for each different route within Section B. Table 10.26 provides a summary of the economic performance, of the entire scheme, with Route B4. The full Transport Economic Efficiency tables are included in Appendix E.

Table 10.26: Route B4 Economic Assessment

Cost or Benefit	Value	Comments
Present Value of Benefits (PVB)	£96.4m	
Present Value of Costs (PVC)	£75.3m	
Net Present Value (NPV)	£21.1m	NPV = PVB – PVC
Benefit to Cost Ratio	1.28	BCR = PVB / PVC

It can be seen that the results of the economic assessment would indicate that Route B4 would be likely to deliver a benefit to cost ratio (BCR) of 1.28, with a net present value (NPV) of £21.1m.

10.8 Route B4, Inner Eastern Bypass of Ballynure - WebTAG Appraisal

10.8.1 B4 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 10.7.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the Appraisal Summary Table (AST) in Section 10.8.7.

10.8.2 B4 Safety Objective

10.8.2.1 B4 Accidents Sub-Objective

The quantitative accident assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme accident statistics for each different route within Section B. Table 10.27 provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual carriageway with Route B4 adopted within Section B.

Table 10.27: Route B4 Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	7	11	-267	-249	-162	2,836
Accident Savings based on COBA rates	37	196	915	1,148	683	54,883

Table 10.27 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway would result in an increase in the number of slight injury accidents when compared to a do-minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that some slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single carriageway, as demonstrated by the comparison against the COBA rates for a single carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route B4 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Route B4 would include one left-in left-out access serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Green Road Junction – the southbound and northbound left-off leads to a T-junction connection with the diverted B95 Calhame Road and original A8. There is a potential for a queue to form which would not be obvious to left turning drivers on the A8, as visibility could be obstructed by a bridge abutment and embankment slopes. This could lead to rear-end shunt collisions.
- B95 Calhame Road – Sharp bend to turn back to the new junction. Possibility of excessive approach speed leading to loss of control.
- Ballybracken Road Junction – There is a junction on the loop to the west of the A8 linking to the existing A8 and into Ballynure. This has the potential to generate

significant traffic flows, particularly if there is a problem at the B58 junction. This could lead to queuing vehicles, rear-end shunt collisions, sudden braking and loss of control.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction, Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during works. The major activities identified are:

- Construction of six new structures, two structures on the line of the existing A8;
- Construction of new fully grade separated junction in the immediate vicinity of the Straid Road/B58 (Carrickfergus Road) in close proximity to Bryantang Water;
- Construction work alongside existing utilities; and
- Traffic management associated with online widening over approximately 2.0km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route B4 involves the construction/replacement of six new structures and two culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

10.8.2.2 B4 Security Sub-Objective

Route B4 is similar to Route B1 and would provide improved footways and pedestrian facilities along the route, and remove the through traffic from Ballynure. The qualitative assessment score for this sub-objective would be *Neutral.*

10.8.3 B4 Economy Objective

The results of the economic assessment for Route B4, as outlined in Section 10.7.5 are presented in the Route B4 AST in Section 10.8.7, with the full Transport Economic Efficiency tables included in Appendix E.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route B4 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

10.8.4 B4 Accessibility Objective

10.8.4.1 B4 Option Values Sub-Objective

The qualitative assessment of Route B4 would be the same as Route B1 and would be *Neutral*. The public transport provision on Route B4 and within Ballynure would be similar to the existing, with existing bus stops in Ballynure retained.

10.8.4.2 B4 Severance Sub-Objective

The assessment of Route B4 is the same as Route B1, see Section 10.2.4.2 for details. The impact on the severance sub-objective would be S*light Positive*.

10.8.4.3 B4 Access to the Transport System Sub-Objective

The qualitative assessment of this sub-objective would be *Neutral* for Route B4, the same as Route B1. The public transport provision will be similar to the existing, with existing bus stops in Ballynure retained. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low.

10.8.5 B4 Integration Objective

10.8.5.1 B4 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section B are the existing bus stops along the A8 and in Ballynure. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

10.8.5.2 B4 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation and PPS 6 Planning, Archaeology and the Built Heritage, further design development will be required to mitigate or minimise impacts.

10.8.5.3 B4 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route B4 would be *Beneficial.*

10.8.6 B4 Supporting Analysis

10.8.6.1 B4 Affordability

The Route B4 scheme costs is reported in Section 10.5.3 with a total cost estimate of **£49,460,675** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

10.8.6.2 B4 Practicality

The Practicality of Route B4 is reported in the Section 10.5.1.6 of the DMRB engineering assessment.

10.8.6.3 B4 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. Route B4 is to the east of Ballynure, and within Sub-corridor C (as discussed in Section 6.4.1). The public response indicated there was no clear public preference for an eastern or western bypass of the village, and the further question asking members of the public to rank the Sub-Corridors in order of preference provided no clear preference.

10.8.7 B4 Appraisal Summary Table

The appraisal for Route B4 is summarised and presented in an AST, overleaf.

Table 10.28: Route B4 Appraisal Summary Table

Route B4, Inner Eastern Bypass of Ballynure			**Problems:** loss of one residential property and agricultural land, and impact on landscape and biodiversity.	**Present value of costs to public:** £75.3 million*
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise		Estimated Population Annoyed (Without Scheme): 52 Estimated Population Annoyed (With Scheme):80	Net Noise Annoyance: 28
	Local Air Quality	There are a total of 618 properties within 200m of the proposed route corridor. In both 2016 and 2031, 183 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 435 properties are predicted to experience an improvement.	The net change for NO_2 would be -356 for the assumed design year 2031, with -38 for PM_{10} and -34 for $PM_{2.5}$.	618 properties within 200m
	Greenhouse Gases		Change in Carbon Emissions over 60 year appraisal period (tonnes): 64,451*	£2.7m*
	Landscape	The route would be visually prominent in the wider landscape. Bryantang Water and Castle Water are crossed and require new bridge structures. The east side of Ballynure has a greater capacity for the landscape to accommodate a new road.		Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings and will impact on visual amenity of existing dwellings on the periphery of the village. Where the route passes Ballynure there is potential impact on setting for townscape and industrial landscape features of cultural significance.		Neutral
	Heritage/ Historic Resources	The route will cross directly over the locations of a possible enclosure site and a Holy Well site 33. Although there are no above ground remains of these sites, groundwork operations will have a moderate adverse impact upon any sub-surface remains. This route will also cross greenfield land and has the potential to impact upon any sub-surface archaeological features within its line.		Moderate Adverse
	Biodiversity	There will be a slight adverse impact on protected species including badgers and birds and a potential moderate adverse impact on bats and otters. Loss of field boundaries, improved grassland, riparian habitat at the location of new river crossings and low quality marshy grassland may also occur. There will be a moderate adverse impact to a linear section of plantation woodland on the river bank, resulting in a loss of part of this habitat during the construction of new river crossings.		Moderate Adverse
	Water Environment	The route will require a new crossing of Bryantang Water and Castle Water, and the enlargement, replacement and/or extension of the other culverts carrying the watercourse beneath the A8 resulting in a slight adverse impact. The route will cross approximately 60m of floodplain which would have an insignificant impact upon the extent of flood storage capacity within this section of the watercourses catchment.		Slight Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclists. Removing through traffic from the settlement of Ballynure would increase pedestrian and cyclist safety, activity and connectivity with community facilities.		Moderate Beneficial

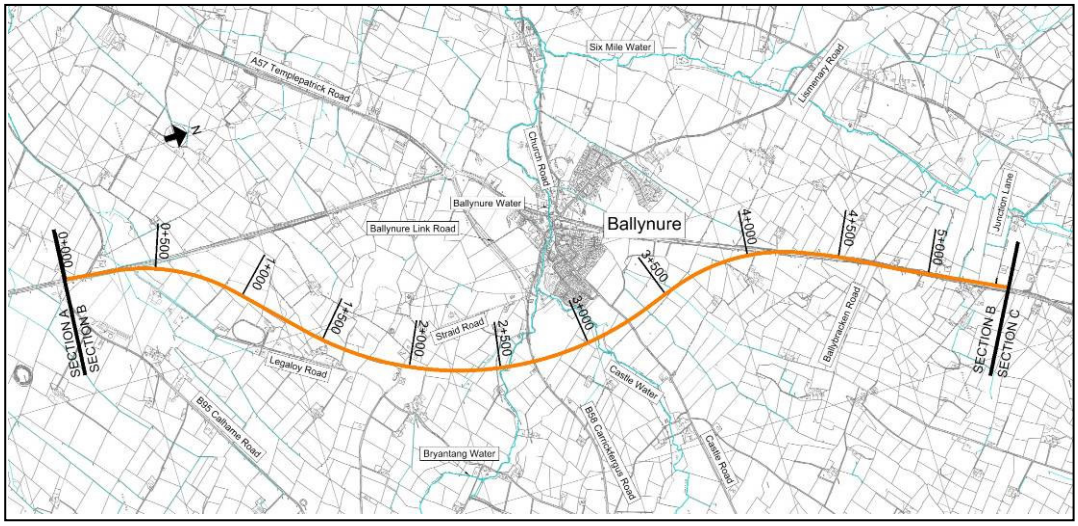
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak. All these factors would contribute to an enhanced driving experience along this section of the A8, and an improved driving experience within Ballynure village.		Moderate Beneficial
Safety	Accidents	Improvement on existing single carriageway. 1 No. left-in left-out access, tight radius bend on Calhame Road, T-junction on Green Road and junction on Ballybraken loop were identified by a Road Safety Auditor as potential safety hazards.	Accident Benefits = £2.8m*	Slight Beneficial
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		Central Government PVC = £ 75.3 million*	PVC = £75.3m*
	Transport Economic Efficiency: Business Users		Business Users PVB = £64.0 million*	PVB = £64.0m*
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £32.3 million*	PVB = £ 32.3m*
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Ballynure would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2 and PPS 6.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

* Figures calculated for the whole scheme with constant routes within Section A and C

10.9 Route B5, Outer Eastern Bypass of Ballynure - DMRB Assessment

Route B5, as detailed in Section 7, would provide an outer bypass to the east of Ballynure leaving the existing corridor immediately after the existing Legaloy Road junction. The route would then head northeast, before coming tight to the edge of Ballynure, and rejoining the existing A8 500m before Ballybraken Road.

Figure 10.5: Route B5 Plan



10.9.1 B5 Engineering Assessment

10.9.1.1 B5 Geometric Assessment

The Route B5 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

The junction strategy was previously discussed in Section 5.5, which outlined that compact grade separated junctions would be provided at Green Road/ Calhame Road/ Legaloy Road and Ballybraken Road, with a new full grade separated junction provided at the B58 Carrickfergus Road. Straid Road and Castle Road would be maintained with a connection across the scheme, but with no connection to the new dual carriageway.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junction at Green Road/ Calhame Road/ Legaloy Road will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting Calhame Road into the junction.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

10.9.1.2 B5 Structures

Route B5 would require seven new structures:

- STJ21 – Green Road/ Calhame Road/ Legaloy Road Junction Overbidge;
- STR43 – Straid Road Overbridge;
- STJ22 – A57 Templepatrick Road/ B58 Carrickfergus Road Junction Overbridge;
- STW03 – Bryantang Water Underbridge;
- STW04 – Castle Water Underbridge
- STR44 – Castle Road Overbridge; and
- STJ23 – Ballybraken Road Junction Overbridge.

Geometrically, all seven structures would be relatively simple with the five overbridges having reasonable straight alignments. The structures will generally have perpendicular crossings with the exception of STR43 and STR44 which will have a slight skew.

STJ21 and STJ23 would be constructed on the line of the existing route and would require more significant traffic management and make access to the works more difficult. STJ22, would be constructed just off-line of the existing B58 (Carrickfergus Road).

STR43 and STR44 will be constructed on the line of Straid Road and Castle Road and it will be necessary to temporarily close these side roads, or construct a temporary parallel road during the construction works.

10.9.1.3 B5 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route B5 is the same as Route B4 and confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. However, to achieve adequate fall between the road level and the watercourse, some of the online sections of the proposed dual carriageway need to be raised above the existing road level. For the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

Cross drainage was modelled using the 1-in-100 year flows for the various catchments with an additional flow of 20% to account for climate change, and culvert sizes were calculated using these flows. For Route B5, there would be a total of two culverts and two bridges (refer to Section 10.9.1.2). The deepest culvert was for the Green Burn which would be 2100mm deep.

10.9.1.4 B5 Utility Services

Route B5 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water, Bord Gais Networks and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 10.29 below.

Table 10.29: Route B5 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Ballynure.	308,000
Northern Ireland Water	Diversions of watermains and sewers along the A8, and watermain crossing the route adjacent to Castle Road.	480,260
Bord Gais Networks	Diversion/protection of gas main south of Ballybraken Road.	1,106,310
BT	Diversion of overhead and underground BT lines crossing the route at various points.	280,200
	Total Costs	**2,174,770**

Route B5 would have similar impacts to Route B4, with impacts on the existing utilities mainly on the online sections, with other impacts on the off-line sections where the route crosses utilities. The main impact would be on the high pressure gas main to the north of Ballynure, watermains along the A8 and the overhead electricity cables (110kv) which cross the scheme just north of the Ballybraken Road.

10.9.1.5 B5 Geotechnics

Route B5 is a mixture of widening the existing road and off-line construction. The ground conditions are generally superficial deposits, which are thin and locally absent in areas. Alluvial deposits will be present where the alignment crosses the Ballynure Water valley bottom, and it may be necessary to dig out and replace some of this. The cut earthworks associated with Route B4 are likely to intersect the basalt bedrock which is relatively shallow. No areas of possible contamination have been identified along this route.

The preliminary ground investigations indicated shallow groundwater to the south and north of Ballynure Water. The shallow groundwater may require drainage measure during construction to stop groundwater discharging into excavations.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 10.7.2.5.

10.9.1.6 B5 Construction Issues

The construction issues associated with Route B5 are the same as Route B4. The works are likely to result in some disruption to the existing A8 traffic during construction, and temporary speed limit on the A8 during the works would be required.

The construction of Route B5 would require the import of additional fill material which could be obtained from borrow pits on or adjacent to the site.

The construction of two structures will be on the line of the existing A8 which will require significant traffic management and make access to the works more difficult. The remaining structures would be constructed off-line making the construction process simpler.

10.9.2 B5 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

10.9.2.1 B5 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route B5 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would significantly increase by 50% and 54% in 2016 and 2031 respectively, and the PM_{10} emissions by 100% and 113% in 2016 and 2031 respectively.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

10.9.2.2 B5 Cultural Heritage

Route B5 will have similar impacts on Cultural Heritage as Route B4. However, Route B5 would only impact on the Holy Well site, with no impact on three other sites potentially affected by Route B4. Route B5 would also impact on the Industrial Heritage Site, Mearne's Bridge, which is crossed by Route B5, however no trace of this site was observed during a site visit. A site walkover noted a possible archaeological feature within an area immediately adjacent to the route, and therefore the route could impact on this site.

The footprint of this route will run through a large expanse of open land and therefore may impact upon previously unrecorded deposits of archaeological potential.

The assessment of Route B5, based on possible impact on one known archaeological site, one industrial heritage site and the potential impact to unknown archaeology, is that it would have a *Moderate Adverse* impact.

10.9.2.3 B5 Landscape

The impact of Route B5 on landscape will be the same as Route B4. The route also traverses the narrow river valleys on low embankment with bridge/culvert structures. The assessment suggests that this route would have a *Moderate Adverse* effect on Landscape. The overall landscape effect should however be tempered with a slight beneficial effect on townscape within Ballynure.

The predominant visual effect of this alignment will be on individual dispersed properties, but also potentially westwards on houses on the edge of Ballynure, however the increased distance between the route and the east of Ballynure will reduce the visual impact. The overall visual effect on properties and on receptors would be *Slight Adverse.*

10.9.2.4 B5 Nature Conservation

There are no statutory or non-statutory designated sites affected by this route. The principal habitats affected include field boundaries such as hedgerows, extensive areas of improved grasslands, an area of scattered trees, one area of marshy grassland and three areas of plantation broadleaved woodland. The area of marshy grassland was identified as a rush pasture which can be considered to be a Biodiversity Action Plan (BAP) Habitat in Northern Ireland.

Impacts to otters, bats, badgers, birds and fisheries will be similar to Route B4 through loss of habitat.

Principle impacts will be similar to Route B4, and therefore overall Route B5 will have a *Moderate Adverse* effect.

10.9.2.5 B5 Materials

Route B5 is considered to have the same impacts as Route B4, with cuttings intersecting basalt bedrock and the route crossing an isolated spring. It will also create similar quantities of cut and fill material. Therefore the overall affect on geology and materials is considered to be *Slight Adverse*.

10.9.2.6 B5 Noise

Route B5 diverts east earlier than Route B4, and therefore more dwellings are predicted to be subject to moderate and major adverse impacts, primarily along Legaloy Road, Straid Road and Carrickfergus Road. In addition, a number of properties in the vicinity of Ballybraken Road and Junction Lane will have moderate adverse impacts. Dwellings close to Church Road may also be subject to minor adverse impacts. Dwellings in the centre of Ballynure are predicted to be subject to minor and moderate beneficial impact, however this is fewer than predicted with Route B4. Table 10.30 provides the results of the noise assessment for Route B5 in 2031.

Table 10.30: Route B5 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	4	4	0	0
0.1 – 0.9	59	37	1	1
1 – 2.9	186	31	1	0
3 – 4.9	97	7	2	0
5+	144	5	0	0
Total	**486**	**80**	**4**	**1**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

10.9.2.7 B5 Effects on all Travellers

Route B5 would be the same as Route B4 in relation to Effects on all Travellers, and similar to all the other routes. The scheme would improve the pedestrian and cyclists facilities, and safety within Ballynure. It would also provide more free flowing conditions, leading to improved journey times. In addition it would include permanent and safe overtaking opportunities leading to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Moderate Beneficial*.

10.9.2.8 B5 Community and Private Assets

Route B5 is similar to Route B4 in relation to Community Assets. The route would not result in any direct impacts on community facilities within Ballynure and would reduce the current level of severance experienced in the village. The overall effect on Community Assets would be *Slight Beneficial*, the same as Route B4.

Three residential properties would be impacted through some loss of gardens and approximately 281 hectares of Grade 2 agricultural land would be lost to the scheme. Sixteen farm businesses have been identified which would endure an adverse impact on the management, performance and future viability. Five have been assessed to be significant adverse, three moderate adverse and eight slight adverse impacts. Five further agricultural units were identified where the land is currently rented out. The overall effect of Route B5 on Private Assets would be *Moderate Adverse*.

10.9.2.9 B5 Road Drainage and the Water Environment

Route B5 crosses Green Burn, Bryantang Water, Castle Water and one other tributary and would have very similar impacts to Route B4. New structures would be required across Bryantang Water and Castle Water. The principle impacts on these watercourses will be the potential for increased velocity and volume of road runoff, and the risk of pollution from road runoff during construction and operation.

The floodplains are rather narrow at the point where the route crosses the watercourses, and therefore only crosses approximately 30m of floodplain.

The key impact for this route is the significant increase in impermeable surface and new crossings of Bryantang Water and Castle Water. The impact on the water environment has been assessed to be a *Slight Adverse*.

10.9.3 B5 Cost Estimate

The Stage 2 cost estimate for Route B5 is presented in Table 10.31, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 10.31: Route B5 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**28,282,255**
Contractors Overheads & Profit (10%)	£	2,828,225
Sub Total	**£**	**31,110,480**
Land Costs and Compensation	£	3,933,060
Preparation, surveys, design (9%)	£	2,799,943
Supervision (5%)	£	1,555,524
Contingency/Risk Allowance	£	1,012,245
Sub Total	**£**	**40,411,253**
Optimism Bias *(20% construction, 5% land and compensation)*	£	7,492,292
TOTAL ESTIMATED COST	**£**	**47,903,544**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£47,903,544**.

10.9.4 B5 Traffic Assessment

Route B5 has been represented by the Eastern Outer Bypass option in the traffic model (see section 5.3). The central growth traffic forecasts for Route B5 for the design year, 2031, are presented in Table 10.32 below.

Table 10.32: Route B5 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Do-Minimum without dual carriageway		Do-Something with Route B5	
	(Total 2-way AADT)	(*Total 2-way HGV AADT)*	*(Total 2-way AADT)*	(*Total 2-way HGV AADT)*
New A8 (B95 Green Road to A57 Templepatrick Road)	n/a	n/a	16,543	1,985
New A8 (A57 Templepatrick Road to Ballybraken Road)	n/a	n/a	20,240	2,024
Original A8 (B95 Green Road to A57 Templepatrick Road)	16,005	1,920	869	26
Original A8 (through Ballynure)	22,559	3,158	3,136	972
A57 Templepatrick Road	11,007	1,541	10,641	1,490
B58 Carrickfergus Road	4,489	584	5,855	527

10.9.5 B5 Economic Assessment

The economic assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme economics for each different route within Section B. Table 10.33 provides a summary of the economic performance, of the entire scheme, with Route B5. The full Transport Economic Efficiency tables are included in Appendix E.

Table 10.33: Route B5 Economic Assessment

Cost or Benefit	Value	Comments
Present Value of Benefits (PVB)	£98.1m	
Present Value of Costs (PVC)	£73.5m	
Net Present Value (NPV)	£24.5m	NPV = PVB – PVC
Benefit to Cost Ratio	1.33	BCR = PVB / PVC

It can be seen that the results of the economic assessment would indicate that Route B5 would be likely to deliver a benefit to cost ratio (BCR) of 1.33, with a net present value (NPV) of £24.5m.

10.10 Route B5, Outer Eastern Bypass of Ballynure - WebTAG Appraisal

10.10.1 B5 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 10.9.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the Appraisal Summary Table (AST) in Section 10.10.7.

10.10.2 B5 Safety Objective

10.10.2.1 B5 Accidents Sub-Objective

The quantitative accident assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme accident statistics for each different route within Section B. Table 10.34 provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual carriageway with Route B5 adopted within Section B.

Table 10.34: Route B5 Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	7	11	-267	-249	-162	2,815
Accident Savings based on COBA rates	37	196	915	1,148	683	54,839

Table 10.34 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway would result in an increase in the number of slight injury accidents when compared to a do-minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that some slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single carriageway, as demonstrated by the comparison against the COBA rates for a single

carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route B5 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Route B5 would include one left-in left-out access serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Green Road Junction – the southbound and northbound left-off leads to a T-junction connection with the diverted B95 Calhame Road and original A8. There is a potential for a queue to form which would not be obvious to left turning drivers on the A8, as visibility could be obstructed by a bridge abutment and embankment slopes. This could lead to rear-end shunt collisions.
- B95 Calhame Road – Sharp bend to turn back to the new junction. Possibility of excessive approach speed leading to loss of control.
- Ballybracken Road Junction – There is a junction on the loop to the west of the A8 linking to the existing A8 and into Ballynure. This has the potential to generate significant traffic flows, particularly if there is a problem at the B58 junction. This could lead to queuing vehicles, rear-end shunt collisions, sudden braking and loss of control.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during works. The major activities identified are:

- Construction of seven new structures, two structures on the line of the existing A8;
- Construction work alongside existing utilities; and
- Traffic management associated with online widening over approximately 1.5km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route B5 involves the construction/replacement of seven new structures and two culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

10.10.2.2 B5 Security Sub-Objective

Route B5 is similar to Route B4 and would provide improved footways and pedestrian facilities along the route, and remove the through traffic from Ballynure. The qualitative assessment score for this sub-objective would be *Neutral.*

10.10.3 B5 Economy Objective

The results of the economic assessment for Route B5, as outlined in Section 10.9.5 are presented in the Route B5 AST in Section 10.10.7, with the full Transport Economic Efficiency tables included in Appendix E.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route B5 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

10.10.4 B5 Accessibility Objective

10.10.4.1 B5 Option Values Sub-Objective

The qualitative assessment of Route B5 would be the same as Route B1 and would be *Neutral*. The public transport provision on Route B5 and within Ballynure would be similar to the existing, with existing bus stops in Ballynure retained.

10.10.4.2 B5 Severance Sub-Objective

The assessment of Route B5 is the same as Route B1, see Section 10.2.4.2 for details. The impact on the severance sub-objective would be S*light Positive*.

10.10.4.3 B5 Access to the Transport System Sub-Objective

The qualitative assessment of this sub-objective would be *Neutral* for Route B5, the same as Route B1. The public transport provision will be similar to the existing, with existing bus stops in Ballynure retained. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low.

10.10.5 B5 Integration Objective

10.10.5.1 B5 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section B are the existing bus stops along the A8 and in Ballynure. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

10.10.5.2 B5 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be Neutral. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation and PPS 6 Planning, Archaeology and the Built Heritage, further design development will be required to mitigate or minimise impacts.

10.10.5.3 B5 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route B5 would be *Beneficial.*

10.10.6 B5 Supporting Analysis

10.10.6.1 B5 Affordability

The Route B5 scheme costs is reported in Section 10.9.3 with a total cost estimate of **£47,903,544** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

10.10.6.2 B5 Practicality

The Practicality of Route B5 is reported in the Section 10.9.1.6 of the engineering assessment.

10.10.6.3 B5 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. Route B5 is to the west of Ballynure, and within Sub-corridor D (as discussed in Section 6.4.1).

The public response indicated there was no clear public preference for an eastern or western bypass of the village, and the further question asking members of the public to rank the Sub-Corridors in order of preference provided no clear preference.

10.10.7 B5 Appraisal Summary Table

The appraisal for Route B5 is summarised and presented in an AST, overleaf.

Table 10.35: Route B5 Appraisal Summary Table

Route B5, Outer Eastern Bypass of Ballynure			**Problems:** loss of agricultural land, and impact on landscape and biodiversity.	**Present value of costs to public:** £73.5 million*
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	Estimated Population Annoyed (Without Scheme): 44 Estimated Population Annoyed (With Scheme):67		Net Noise Annoyance: 23
	Local Air Quality	There are a total of 504 properties within 200m of the proposed route corridor. In both 2016 and 2031, 69 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 435 properties are predicted to experience an improvement.	The net change for NO_2 would be -409 for the assumed design year 2031, with -56 for PM_{10} and -50 for $PM_{2.5}$. l	504 properties within 200m
	Greenhouse Gases	Change in Carbon Emissions over 60 year appraisal period (tonnes): 67,591*		£2.7m*
	Landscape	The route would be visually prominent in the wider landscape resulting in a sight adverse impact. Bryantang Water and Castle Water are crossed and require new bridge structures. The east side of Ballynure has a greater capacity for the landscape to accommodate a new road structure.		Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings and will impact on visual amenity of existing dwellings on the periphery of the village.		Neutral
	Heritage/ Historic Resources	A possible unrecorded enclosure site was noted during the walkover. However, this site is not within the line of the route and should not be impacted upon. Additionally, the line of this route will cross directly over the location of a Holy Well. This option also runs across greenfield and has the potential to impact upon any sub-surface archaeological features within its route.		Moderate Adverse
	Biodiversity	The main impacts are the potential slight adverse effects on protected species of mammals and birds. Of most significance are potential adverse impacts to otter and bats. Loss of field boundaries, improved grassland and low quality marshy grassland may also occur. There will be a moderate adverse impact to a linear section of plantation woodland on the river bank, resulting in a loss of part of this habitat during the construction of new river crossings.		Moderate Adverse
	Water Environment	The route will require a new crossing of Bryantang Water and Castle Water, and the enlargement, replacement and/or extension of the other culverts carrying the watercourse beneath the A8. This route will also require a number of new and extended crossings of smaller watercourses and field drains, including Green Burn. The route will cross approximately 30m of floodplain which would impact upon the extent of flood storage capacity within this section of the watercourses catchment.		Slight Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclists. Removing through traffic from the settlement of Ballynure would increase pedestrian and cyclist safety, activity and connectivity with community facilities.		Moderate Beneficial
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak. All these factors would contribute		Moderate

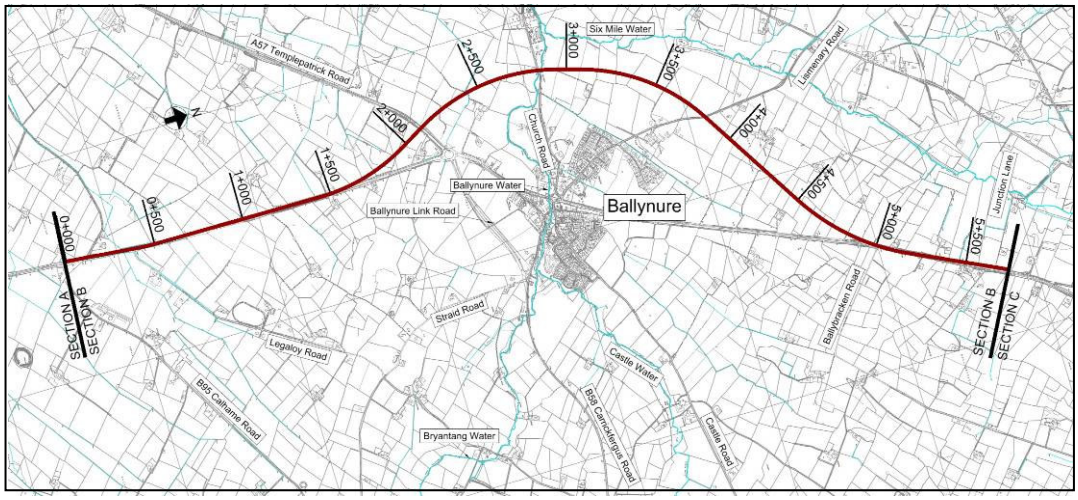
		to an enhanced driving experience along this section of the A8, and an improved driving experience within Ballynure village.		Beneficial
Safety	Accidents	Improvement on existing single carriageway. 1 No. left-in left-out access, tight radius bend on Calhame Road, T-junction on Green Road and junction on Ballybraken loop were identified by a Road Safety Auditor as potential safety hazards.	Accident Benefits = £2.8m*	Slight Beneficial
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		Central Government PVC = £ 73.5 million*	PVC = £73.5m*
	Transport Economic Efficiency: Business Users		Business Users PVB = £64.4 million*	PVB = £64.4m*
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £33.7 million*	PVB = £ 33.7m*
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Ballynure would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2 and PPS 6.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

* Figures calculated for the whole scheme with constant routes within Section A and C

10.11 Route B6, Hybrid Inner Western Bypass of Ballynure – DMRB Assessment

Route B6 would provide an inner bypass to the west of Ballynure, and is a combination of Routes B2 and B3. Route B6 is the first half of Route B2 and the second half of Route B3, therefore incorporating the halves of those routes with less impacts.

Figure 10.6: Route B6 Plan



10.11.1 B6 Engineering Assessment

10.11.1.1 B6 Geometric Assessment

The Route B6 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

The junction strategy was previously discussed in Section 5.5, which outlined that compact grade separated junctions would be provided at Green Road/ Calhame Road/ Legaloy Road and Ballybraken Road, with a new full grade separated junction provided at the A57 Templepatrick Road. Church Road and Lismenary Road would be maintained with a connection across the scheme, but with no connection to the new dual carriageway.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junction at Green Road/ Calhame Road/ Legaloy Road will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting Calhame Road into the junction. In addition, the connection onto the southbound carriageway from the A57 Templepatrick Road junction will require a departure for the horizontal radii.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

10.11.1.2 B6 Structures

Route B6 would require the same five new structures as Route B2:

- STJ21 – Green Road/ Calhame Road/ Legaloy Road Junction Overbridge;
- STJ22 – A57 Templepatrick Road/ B58 Carrickfergus Road Junction Overbridge;
- STW02/STR41 – Ballynure Water and Church Road Underbridge;
- STR42 – Lismenary Road Overbridge; and
- STJ23 – Ballybraken Road Junction Overbridge.

The layout of the five structures and issues associated with the construction of the new bridges are the same as Route B2.

10.11.1.3 B6 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route B6 is the same as B2 and confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. It would also require a total of two culverts with one bridge (refer to Section 10.11.1.2), the same as Route B2.

10.11.1.4 B6 Utility Services

Route B6 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water, Bord Gais Networks and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 10.36 below.

Table 10.36: Route B6 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
NIE	Diversion of overhead power lines crossing the A8 north of Ballynure.	321,000
Northern Ireland Water	Diversions of watermains and sewers along the A8, and the watermain crossing the route adjacent to Castle Road.	364,780
Bord Gais Networks	Diversion/protection of gas main south of Ballybraken Road.	1,106,3010
BT	Diversion of overhead and underground BT lines crossing the route at various points.	393,550
	Total Costs	**2,185,640**

Route B6 would impact on the existing utilities mainly on the online sections, with other impacts on the off-line sections where the route crosses utilities. The main impact would be on the high pressure gas main to the north of Ballynure, watermains along the A8 and the overhead electricity cables (110kv) which cross the scheme just north of the Ballybraken Road.

10.11.1.5 B6 Geotechnics

The geotechnical aspects of Route B6 are the same as Route B2 and B3. The ground conditions are generally superficial deposits, however there are areas of soft alluvial clay and gravelly alluvial deposits. Cut earthworks associated with the route are likely to intersect the basalt bedrock and no areas of possible contamination have been identified along this route. Drainage measures may be required to mitigate the groundwater flow discharging into the cut earthworks.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 10.11.2.5.

10.11.1.6 B6 Construction Issues

The construction issues associated with Route B6 are the same as Route B2. The works are likely to result in some disruption to the existing A8 traffic during construction, and temporary speed limit during the works would be required. The construction of Route B6 may also require the temporary closure of some of the existing side roads during the construction period.

The construction of Route B6 would require the import additional fill material which could be obtained from other from borrow pits on or adjacent to the site.

10.11.2 B6 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

10.11.2.1 B6 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route B6 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would significantly increase by 73% and 56% in 2016 and 2031 respectively, and the PM_{10} emissions by 120% and 103% in 2016 and 2031 respectively.

The significance of change at the representative receptors for NO_2 are classed as ranging from moderate adverse to moderate beneficial and the significance of change at the representative receptors for PM_{10} are classed as ranging from slight adverse to slight beneficial. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

10.11.2.2 B6 Cultural Heritage

Route B6 would have similar impacts to Route B2. However, Route B6 is further from the Industrial Heritage Site, Hillis Bridge, although it would still have a slight impact on the setting of this site. There are ten known recorded local sites within the immediate vicinity of Route B6, however there will be no impact on these sites.

An examination of aerial photographic evidence identified a cropmark feature very close to the route, and if the feature is archaeological in nature there is a potential impact. The footprint of this option will run through a large expanse of open land and therefore may impact upon previously unrecorded deposits of archaeological potential.

The assessment of Route B6, based on the impact on one known site and the potential impact to unknown archaeology, is that it would have a *Slight Adverse* impact.

10.11.2.3 B6 Landscape

Route B6 is considered to have similar impacts to Route B2. The assessment suggests that this route would have a *Moderate Adverse* effect on Landscape. The overall landscape effect should however be tempered with a slight beneficial effect on townscape within Ballynure.

Route B6 would visually affect the 'Ballynure River' Landscape Policy Area, and in the more expansive visual envelope would have a visual impact on views to and from the AONB. The proposed junction arrangements would however have a visual effect in the wider landscape. This route would have a *Moderate Adverse* visual effect.

10.11.2.4 B6 Nature Conservation

Route B6 will have very similar impacts to Route B2. The principal habitats affected will include hedgerows, areas of scattered trees and four areas of marshy grassland, two of which are very small patches. The impact on other protected species is considered to be the same as Route B2.

The possible presence of badgers and salmonid species along the route could result in adverse impact on these species. However, appropriate mitigation may adequately address these issues. Key concerns are the potential impacts to populations of bats, otters and bird species of conservation concern. Overall Route B6 will have a *Moderate Adverse* effect.

10.11.2.5 B6 Materials

Route B6 is considered to have similar impacts to B2 and will cross an area where the superficial deposits are relatively thin and therefore many of the cut earthworks will intersect the basalt bedrock. In addition, cuttings associated with this route may intersect the flow of groundwater, which would require measures to prevent impacts to the flow.

The balance of fill and cut material for Route B6 will be similar to Route B2 and therefore the overall affect on geology and materials is considered to be *Slight Adverse*

10.11.2.6 B6 Noise

Route B5 follows a similar alignment to Routes B1, B2 and B3 and therefore has similar noise impacts. The main noise impacts would be on dwellings along Church Road and houses to the east of Lismenary Road which would be subject to moderate and major adverse impacts. In addition, dwellings in the vicinity of Junction Lane may be subject to moderate or major adverse impacts. However, dwellings in the centre of Ballynure and those along Castletown Road will be subject to major beneficial impact, as traffic is diverted along the new A8 alignment. Table 10.37 provides the results of the noise assessment for Route B6 in 2031.

Table 10.37: Route B6 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	2	2	0	0
0.1 – 0.9	67	19	0	0
1 – 2.9	153	44	1	1
3 – 4.9	126	24	1	0
5+	172	10	2	0
Total	**518**	**97**	**4**	**1**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

10.11.2.7 B6 Effects on all Travellers

Route B6 would be the same as the other Section B routes in relation to Effects on all Travellers. The scheme would improve the pedestrian and cyclists facilities, and safety within Ballynure. It would also provide more free flowing conditions, leading to improved journey times. In addition it would include permanent and safe overtaking opportunities leading to decreasing levels of driver stress.

The overall effect on All Travellers for this route would be *Moderate Beneficial*.

10.11.2.8 B6 Community and Private Assets

Route B6 is similar to Route B1 in relation to Community Assets. The route would not result in and direct impacts on community facilities within Ballynure and would reduce the current level of severance experienced in the village. The overall effect on Community Assets would be *Slight Beneficial*, the same as Route B1.

Four residential properties would be impacted through some loss of gardens and approximately 314 hectares of Grade 2 agricultural land would be lost to the scheme. Eighteen farm businesses have been identified which would endure an adverse impact on the management, performance and future viability. Five have been assessed to be significant adverse, four moderate adverse and nine slight adverse impacts. Ten further agricultural units were identified where the land is currently rented out. The overall effect of Route B6 on Private Assets would be *Moderate Adverse*.

10.11.2.9 B6 Road Drainage and the Water Environment

Route B6 would have similar impacts on surface and ground watercourses as Route B2, with crossings of Green Burn, Ballynure Water and another minor watercourse. The route will also require a new structure across Ballynure Water, and the enlargement, replacement and/or extension of the other culverts carrying the watercourses beneath the A8.

The effect of this route is assessed as being *Slight Adverse,* the same as Route B2.

10.11.3 B6 Cost Estimate

The Stage 2 cost estimate for Route B6 is presented in Table 10.38, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 10.38: Route B6 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**31,676,941**
Contractors Overheads & Profit (10%)	£	3,167,694
Sub Total	**£**	**34,844,635**
Land Costs and Compensation	£	3,281,000
Preparation, surveys, design (9%)	£	3,136,017
Supervision (5%)	£	1,742,232
Contingency/Risk Allowance	£	1,496,910
Sub Total	**£**	**44,500,793**
Optimism Bias *(20% construction, 5% land and compensation)*	£	8,408,009
TOTAL ESTIMATED COST	**£**	**52,908,802**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total cost estimate of **£52,908,802**.

10.11.4 B6 Traffic Assessment

Route B6 has been represented by the Western Outer Bypass option in the traffic model (see section 5.3) and therefore has the same forecast flows as Route B1, B2 and B3. The central growth traffic forecasts for Route B6 for the design year, 2031, are presented in Table 10.39 below.

Table 10.39: Route B6 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Do-Minimum without dual carriageway		Do-Something with Route B3	
	(Total 2-way AADT)	(*Total 2-way HGV AADT)*	*(Total 2-way AADT)*	(*Total 2-way HGV AADT)*
A8 (B95 Green Road to A57 Templepatrick Road)	16,005	1,920	17,126	1,883
New A8 (A57 Templepatrick Road to Ballybraken Road)	n/a	n/a	22,010	2,861
Original A8 (through Ballynure)	22,559	3,158	2,422	48
A57 Templepatrick Road	11,007	1,541	11,633	1,396
B58 Carrickfergus Road	4,489	584	5,101	510

10.11.5 B6 Economic Assessment

The economic assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme

economics for each different route within Section B. Table 10.40 provides a summary of the economic performance, of the entire scheme, with Route B6. The full Transport Economic Efficiency tables are included in Appendix E.

Table 10.40: Route B6 Economic Assessment

Cost or Benefit	Value	Comments
Present Value of Benefits (PVB)	£118.9m	
Present Value of Costs (PVC)	£78.6m	
Net Present Value (NPV)	£40.3m	NPV = PVB – PVC
Benefit to Cost Ratio	1.51	BCR = PVB / PVC

It can be seen that the results of the economic assessment would indicate that Route B6 would be likely to deliver a benefit to cost ratio (BCR) of 1.51, with a net present value (NPV) of £40.3m.

10.12 Route B6, Hybrid Inner Western Bypass of Ballynure – WebTAG Appraisal

10.12.1 B6 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 10.3.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the Appraisal Summary Table (AST) in Section 10.11.7.

10.12.2 B6 Safety Objective

10.12.2.1 B6 Accidents Sub-Objective

The quantitative accident assessment of routes within Section B has been undertaken using a constant route within Section A and C (Route A2 and C1). This has provided overall scheme accident statistics for each different route within Section B. Table 10.41 provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual carriageway with Route B6 adopted within Section B.

Table 10.41: Route B6 Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	9	18	-242	-215	-142	5,022
Accident Savings based on COBA rates	39	202	940	1,150	702	56,733

Table 10.41 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway would result in an increase in the number of slight injury accidents when compared to a do-

minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that some slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single carriageway, as demonstrated by the comparison against the COBA rates for a single carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route B6 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received which are the same as Route B2:

- Route B6 would include two left-in left-out accesses serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Green Road Junction – the southbound left-off leads to a T-junction connection with the diverted B95 Calhame Road. There is a potential for a queue to form which would not be obvious to left turning southbound drivers on the A8, as visibility could be obstructed by a bridge abutment and embankment slopes. This could lead to rear-end shunt collisions.
- B95 Calhame Road – Sharp bend to turn back to the new junction. Possibility of excessive approach speed leading to loss of control.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during works. The major activities identified are:

- Construction of five new structures, two structures on the line of the existing A8;
- Construction work alongside existing utilities; and
- Traffic Management associated with online widening over approximately 2.5km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route B6 involves the construction/replacement of five new structures and two culverts beneath the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

10.12.2.2 B6 Security Sub-Objective

Route B6 is the same as Route B2 in relation to the security sub-objective and the qualitative assessment score for this sub-objective would be *Neutral.*

10.12.3 B6 Economy Objective

The results of the economic assessment for Route B6, as outlined in Section 10.11.5 are presented in the Route B6 AST in Section 10.12.7, with the full Transport Economic Efficiency tables included in Appendix E.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route B6 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5.

10.12.4 B6 Accessibility Objective

10.12.4.1 B6 Option Values Sub-Objective

The qualitative assessment of Route B6 would be the same as Route B1 and would be *Neutral*. The public transport provision on Route B6 and within Ballynure would be similar to the existing, with existing bus stops in Ballynure retained.

10.12.4.2 B6 Severance Sub-Objective

The assessment of Route B6 is the same as Route B1, see section 10.2.4.2 for details. The impact on the severance sub-objective would be S*light Positive*.

10.12.4.3 B6 Access to the Transport System Sub-Objective

The qualitative assessment of this sub-objective would be *Neutral* for Route B6, the same as Route B1. The public transport provision will be similar to the existing, with existing bus stops in Ballynure retained. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low.

10.12.5 B6 Integration Objective

10.12.5.1 B6 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section B are the existing bus stops along the A8 and in Ballynure. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

10.12.5.2 B6 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be Neutral. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation and PPS 6 Planning, Archaeology and the Built Heritage, further design development will be required to mitigate or minimise impacts.

10.12.5.3 B6 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route B6 would be *Beneficial.*

10.12.6 B6 Supporting Analysis

10.12.6.1 B6 Affordability

The Route B6 scheme costs is reported in Section 10.11.3 with a total cost estimate of **£52,908,802** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

10.12.6.2 B6 Practicality

The Practicality of Route B6 is reported in the Section 10.11.1.6 of the engineering assessment.

10.12.6.3 B6 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. Route B6 is to the west of Ballynure, and within Sub-corridor B (as discussed in Section 6.4.1).

The public response indicated there was no clear public preference on an eastern or western bypass of the village, and the further question asking members of the public to rank the Sub-Corridors in order of preference provided no clear preference.

10.12.7 B6 Appraisal Summary Table

The appraisal for Route B6 is summarised and presented in an AST, overleaf.

Table 10.42: Route B6 Appraisal Summary Table

Route B6, Hybrid Inner Western Bypass of Ballynure		**Description:** Route B6 would provide an inner bypass to the west of Ballynure, and is a combination of Routes B2 and B3. Route B6 is the first half of Route B2 and the second half of Route B3, therefore incorporating the halves of those routes with less impacts.	**Problems:** loss of agricultural land, and impact on landscape and biodiversity.	**Present value of costs to public:** £78.5 million*
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Assessment***
Environment	Noise	Estimated Population Annoyed (Without Scheme): 38 Estimated Population Annoyed (With Scheme):57		Net Noise Annoyance: 19
	Local Air Quality	There are a total of 513 properties within 200m of the proposed route corridor. In both 2016 and 2031, 78 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 435 properties are predicted to experience an improvement.	The net change for NO_2 would be -577 for 2031, with -72 for PM_{10} and -65 for $PM_{2.5}$.	513 properties within 200m
	Greenhouse Gases	Change in Carbon Emissions over 60 year appraisal period (tonnes): 62,379*		£2.6m*
	Landscape	The route would impact upon the Three and Six Mile Water Valley Local Character Areas which has a distinct landscape and visual appeal that is highly legible and has distinct local cultural associations around Ballynure Water and recent industrial archaeology and land uses resulting in a slight adverse impact to the cultural landscape.		Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings and on existing dwellings on the periphery of the village. Where the route passes Ballynure there is potential slight adverse impact on setting for townscape and industrial landscape features of cultural significance.		Neutral
	Heritage/ Historic Resources	The route crosses over Hillis Bridge site IHR 7 which dates to the early 19th century, although it will not be lost to the scheme, a new road bridge will be in very close proximity and therefore will impact upon the setting of site IHR 7. This route also runs through areas of greenfield that would have archaeological potential.		Sight Adverse
	Biodiversity	There will be a moderate adverse impact to the Ballynure Water and its associated habitats due to the construction of new river crossings. Other habitat affected are hedgerows and marshy grassland. The possible presence of badgers, birds and salmonid species along the route could result in adverse impacts on these species, of most significance are potential adverse impacts to otter and bats.		Moderate Adverse
	Water Environment	The route crosses the Green Burn, Ballynure Water and another minor watercourses. The route will require a new structure across Ballynure Water, and the enlargement, replacement and/or extension of the other culverts carrying the watercourse beneath the A8. Part of Ballynure Water adjacent to the corridor is a local nature area and designated as a salmonid water. This route does not cross any floodplain and therefore will not impact upon the extent of flood storage capacity within this section of the watercourses catchment.		Slight Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclists. Removing through traffic from the settlement of Ballynure would increase pedestrian and cyclist safety, activity and connectivity with community facilities.		Moderate Beneficial

	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak. All these factors would contribute to an enhanced driving experience along this section of the A8, and an improved driving experience within Ballynure village.		Moderate Beneficial
Safety	Accidents	Improvement on existing single carriageway. 2 No. left-in left-out access, tight radius bend on Calhame Road and T-junction on Green Road were identified by a Road Safety Auditor as potential safety hazards.	Accident Benefits = £5.0m*	Slight Beneficial
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		Central Government PVC = £ 78.5 million*	PVC = £78.5m*
	Transport Economic Efficiency: Business Users		Business Users PVB = £78.7 million*	PVB = £78.7m*
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £37.8 million*	PVB = £ 37.8m*
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with existing bus stops provided on the A8.		Neutral
	Severance	The bypass of Ballynure would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2 and PPS 6.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

* Figures calculated for the whole scheme with constant routes within Section A and C

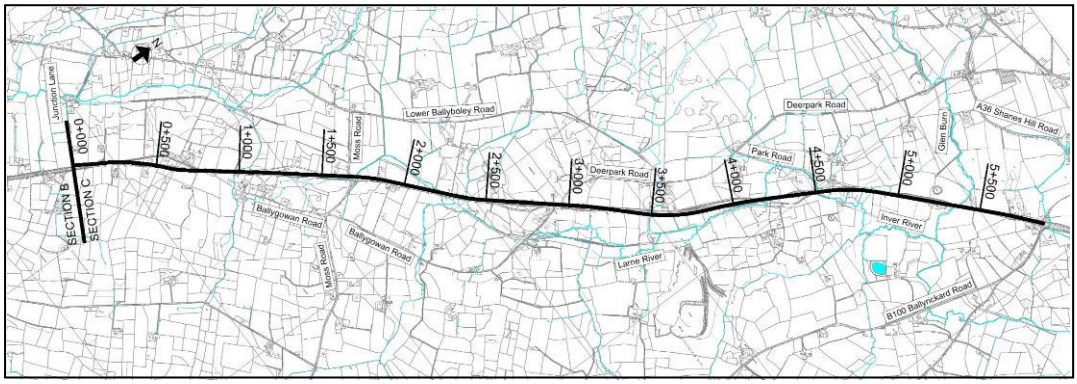
11 Section C - Assessment and Appraisal

Section C considers the online route option for the northern section of the scheme, north of Junction Lane.

11.1 Route C1, Online Improvement Northern Section - DMRB Assessment

Route C1, as detailed in Section 7, would provide an online solution for Section C, and involve widening the existing carriageway between Junction Lane and the Ballyrickard Road. The route would involve a mixture of widening to the east and west of the existing carriageway to minimise the impact on adjacent properties and land.

Figure 11.1: Route C1 Plan



11.1.1 C1 Engineering Assessment

11.1.1.1 C1 Geometric Assessment

The Route C1 mainline has been designed, both horizontally and vertically, in accordance with the DMRB TD 9/93 design standards for a design speed of 120kph (70mph). The alignment comprises no Relaxations or Departures from Standard.

Junction strategy was previously discussed in Section 5.5, and new compact grade separated junctions would be provided at Moss Road and midway between Deerpark Road and Park Road, a new roundabout would be provided with the A36 (Shaneshill Road) and the B100 (Ballyrickard Road). The remaining side roads along this section of the scheme will be closed with traffic diverted via adjacent side roads.

The side roads are derestricted (at present) and therefore subject to the national speed limit of 60mph. The layout of the proposed compact grade separated junction between Deerpark Road and Park Road will require a Departure from standard, for a 100kph design speed, for the horizontal radii connecting the old Deerpark Road into the junction. In addition, the A36 (Shaneshill Road) and B100 (Ballyrickard Road) connections to the new roundabout at the northern end of the scheme will require a Departure for the horizontal radii.

The side road and junction designs will be further developed during the more detailed Stage 3 Assessment.

11.1.1.2 C1 Structures

Route B1 would require five new structures:

- STJ23 – Moss Road Junction Overbridge;
- STJ24 – New Deerpark Road Junction Overbridge;
- STW07 – Stewartstown Bridge (Larne River) Underbridge;
- STW08 – Bogtown Bridge (Larne River) Underbridge; and
- STW09 – Lowtown Bridge (Glen Burn) Underbridge.

Geometrically, all five structures would be relatively simple with the two overbridges having reasonable straight alignments, and perpendicular crossings. STJ23 and STJ24 would be constructed on the line of the existing route. This would require more significant traffic management and make access to the works more difficult.

The proposed level of the new dual carriageway would need to be lifted by approximately 1.0m above the existing road level, to provide sufficient level difference between the proposed road and existing watercourses for road drainage system. Therefore at this stage it is considered that it may not be possible to retain the existing bridges across the Larne River and Glen Burn (see Section 2.3), although this will be considered further during the more detailed Stage 3 Assessment.

STW07, STW08 and STW09 may however have to be constructed in two phases to maintain traffic flows along the A8. The first phase would be to construct one half of the structure while traffic uses the existing bridge, before switching traffic across and demolishing the old structure and constructing the second half of the new structure. The construction sequence and traffic management will therefore be more complex than for the construction of a new structure in a greenfield location.

The existing Stewartstown, Bogtown and Lowtown Bridges are single span concrete slab structures and therefore no issues have been identified associated with the demolition of this structure.

11.1.1.3 C1 Drainage

Road drainage has been assessed and a drainage design strategy developed. The assessment of the road drainage for Route C1 confirmed that positive drainage is achievable with outfalls into various watercourses crossing the route. However, to achieve adequate fall between the road level and the watercourse the proposed dual carriageway needs to be raised above the existing road level at some of the crossing points. For the purpose of the Stage 2 assessment, it has been assumed attenuation and pollution control would be required.

Cross drainage was modelled using the 1-in-100 year flows for the various catchments with an additional flow of 20% to account for climate change, and culvert sizes were calculated using these flows. For Route C1, there would be a total of six culverts with three bridges (refer to Section 11.1.1.2). The deepest culverts are for the Larne River tributaries which would be 2100mm deep.

11.1.1.4 C1 Utility Services

Route C1 would impact upon some of the existing utility services within the assessment area. The utility providers of NIE, Northern Ireland Water and BT were contacted and broad utility diversion cost estimates were provided, which are summarised in Table 11.1 below.

Table 11.1: Route C1 Utility Diversion Costs

Utility Service Provider	Description of Works	Approx Diversion/ Protection Costs (£)
Northern Ireland Water	Diversions of watermains along the A8.	506,400
BT	Diversion of 4 sections of underground cables along the eastern verge of the A8.	181,900
	Total Costs	**£688,300**

Route C1 would have impact on the existing utilities because it would follow the existing A8 corridor. The main impacts would be on the underground BT cables and watermains along the eastern verge of the existing A8.

11.1.1.5 C1 Geotechnics

Route C1 would widen the existing road with a mixture of to the west and east, encompassing the existing road into the dual carriageway where possible. The ground conditions to the west of the A8 are superficial deposits, however there a couple of small poorly drain areas along the western edge of the A8. It may be necessary to dig out and replace some of the material in the poorly drained areas, however there are no significant geotechnical issues associated with forming a foundation for the new dual carriageway.

There are areas of made ground along the route associated with the former railway, and there may be small amounts of contaminated material within this area.

Further details are provided on materials and earthwork balance in the materials section of the environmental assessment, Section 11.1.2.5.

11.1.1.6 C1 Construction Issues

Route C1 is an online widening solution for Section C. The online sections of Route C1 would generally retain this existing carriageway and widen it to the west or east, which will result in some disruption to the existing A8 traffic during construction. The switching of widening on alternate sides has been minimised where possible to simplify the construction of the scheme, however this alternating of sides will make the traffic management associated with the works more complex than a straightforward asymmetrical widening scheme. The widening works are likely to require a temporary speed limit of 40mph on the A8 during the works, although it is envisaged both lanes of traffic could be maintained for the majority of the work. The construction of Route C1 may however require the temporary closure of some of the existing side roads during the construction period.

The construction of Route C1 would require the import of additional material which could be obtained from other sections of the scheme, depending on the route selected, or from borrow pits on or adjacent to the site.

Two of the new overbridges, STJ23 and STJ24 would be constructed on the line of the existing A8 and significant traffic management would make access to the works more difficult. The potential replacement of the existing structure across the Larne River and Glen Burn (STW07, STW08 and STW09), as outlined in Section 11.1.1.2, would be undertaken in two stages to maintain traffic flow along the existing A8. Although this will make the construction sequence more complex, it is not considered a significant issue.

11.1.2 C1 Environmental Assessment

The detailed assessment of the environmental impacts has been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*. A summary of the environmental assessment is detailed in the following sections.

11.1.2.1 C1 Air Quality

The concentrations of air quality pollutants (NO_2 and PM_{10}) for Route C1 are considered to be well below the air quality objectives. The assessment against the do-minimum scenario showed total NO_2 emissions would increase by 22% and 24% in 2016 and 2031 respectively, and the PM_{10} emissions by 64% and 74% in 2016 and 2031 respectively.

The significance of change at the representative receptors for NO_2 are classed as ranging from negligible to slight beneficial and the significance of change at the representative receptors for PM_{10} are classed as negligible. However the predicted concentrations are well below the UK air quality objectives and EU limits, and therefore NO_2 and PM_{10} are a low priority consideration.

11.1.2.2 C1 Cultural Heritage

There are five recorded archaeological sites within the immediate vicinity of Route C1, the most important of these sites is the Lowtown Rath and Souterrain, located at the northern

end of the route which has been awarded scheduled protected status. There would not be any physical impact on this site, however there would be some visual impact. The setting of this monument is already compromised by the existing A8 so a sensitive earthwork and landscape design will be required to minimise the impact. The four other sites will not be physically impacted by Route C1.

There are five recorded local Industrial Heritage Sites within the vicinity of Route C1. Only one of these sites, the former Headwood Railway Station, will be impacted by the route. The railway line no longer exists, however a building is situated at the former location of the station. The building is the correct size and orientation of the former station although it is now a dwelling. This building will be removed for Route C1 and it is likely that a full architectural record would be required prior to removal.

The footprint of this option will run through greenfield areas on either side of the existing A8. It is likely that any unknown archaeological features present will have already been impacted by the construction of the existing A8 and improvement works, however ground works may negatively impact on any such remains.

The assessment of Route C1, based on the impact on the setting of the scheduled Historic monument and an Industrial Heritage site, is that it would have a *Moderate Adverse* impact.

11.1.2.3 C1 Landscape

Route C1 is within the Larne Ridgeland LCA, which lies between two upland areas, the Larne Basalt Moorland and Carrickfergus Uplands LCAs. The landscape exhibits a more irregular and less intensively managed field pattern than Section A or B, and is an intimate undulating, drumlin form landscape which is especially noticeable between the Ballyrickard / Shaneshill Road junction and the Moss Road junction.

Any impact of the road widening in this section would be restricted to the existing road corridor, and hedgerow and trees would be lost with some embankments being remodelled. The route will also require the demolition of three discrete residential properties and one further derelict building, however it is unlikely there would be any change to townscape. The impact of the compact grade separated junctions would be localised, however the local landform and presence of the quarry in the vicinity of one junction, provide opportunities to reduce the impact. The assessment suggests that this route would have a *Slight Adverse* effect on Landscape.

The main visual effect in the wider landscape from Route C1 would arise from the proposed new junction arrangements. There is potential with the Moss Road and new Deerpark Road junction to use the local variations in landform to minimise the visual intrusions beyond the immediate vicinity. The A36 (Shaneshill Road)/ B100 (Ballyrickard Road) roundabout visual impact would be contained with localised visual effects on the properties close to the junction. This route would have a *Slight Adverse* visual effect.

11.1.2.4 C1 Nature Conservation

There are no statutory designated sites within, or adjacent to this route. The non-statutory site, Clements Wood, managed by the Woodland Trust, lies to the east of the existing A8 near the northern end of Ballygowan Road. There may be a small loss of habitat to this site from the removal of a narrow strip along the boundary with the A8 to accommodate earth works. New planting will be provided along this boundary.

The principal habitats affected by this route include field boundaries such as hedgerows, areas of improved grasslands, areas of scattered trees, dense scrub, small areas of broadleaved trees and extensive areas of marshy grassland. One of these areas of marshy grassland was identified to be rush pasture and can be considered to be Biodiversity Action Plan (BAP) habitat in Northern Ireland. This is likely to be important for breeding and wintering birds, and invertebrates. This route may result in the loss of marshy grassland thus increasing the fragmentation of this habitat.

The surrounding area and features are considered suitable to support a number of protected species; otters, bats, badgers, and protected birds and fish, although there are no formal records of any of these species along Route C1.

Principle habitats impacted are the loss and fragmentation of marshy grassland, some of which can be considered to be BAP habitat. The possible presence of otters, bats, badgers, birds and salmonid species along the route could result in adverse impact on these species. Overall Route C1 will have a Moderate *Adverse* effect.

11.1.2.5 C1 Materials

Route C1 crosses an area where the superficial deposits are relatively thin and locally absent and some of the relatively shallow cut earthworks will intersect the basalt bedrock. The route however will cross two areas of soft and peaty alluvial present in the valley bottoms.

There are areas of made ground along the route associated with the former railway, and there may be small amounts of contaminated material within this area. There are no springs or rises within the immediate vicinity of the route, however groundwater will be present at a shallow depth.

The proposed route will require a reasonable amount of fill material during the ground works. If this amount of material could not be won from other sections of the route, it would need to be imported from elsewhere. Therefore the overall affect on geology and materials is considered to be *Slight Adverse*.

11.1.2.6 C1 Noise

Dwellings along Route C1 are generally subject to minor or moderate adverse impacts due to the increase in flow and traffic speed along the unchanged alignment. Small regions close to the route are predicted to have minor and moderate noise benefits due to the effect of new earthworks. Table 11.2 provides the results of the noise assessment for Route C1 in 2031.

Table 11.2: Route C1 Noise Assessment

Change in noise level (dB)	***Dwellings subject to change in noise level***		***Number of other sensitive receptors subject to a change in noise level***	
	Increase in noise level	**Decrease in noise level**	**Increase in noise level**	**Decrease in noise level**
0	15	15	0	0
0.1 – 0.9	144	48	1	1
1 – 2.9	150	35	0	1
3 – 4.9	72	1	1	0
5+	18	0	0	0
Total	**384**	**84**	**2**	**2**

The construction noise is likely to be highest for the locations closest to the scheme, although this will depend on the topography and existing infrastructure which may provide screening.

11.1.2.7 C1 Effects on all Travellers

Currently there are limited and intermittent pedestrian and cyclist facilities along this section of the A8. In addition, there are regular bus stops along the existing route but no formal crossing facilities. Route C1 would provide improved pedestrian facilities along the new dual carriageway, and the proposed junctions would provide a safe means of crossing the A8 for pedestrians and cyclists.

Vehicle travellers would be expected to experience a more pleasant journey along the proposed carriageway with more free-flowing conditions. Improvements in travelling times and the inclusion of a permanent, safe overtaking opportunity would lead to a decrease in levels of driver stress. In addition, the views from the dual carriageway would be considered pleasant, although similar to the existing.

The overall effect on all travellers for this route would be *Slight Beneficial*.

11.1.2.8 C1 Community and Private Assets

This route will contribute to an overall improvement to the local road network and connectivity with wider community facilities. There are a number of properties along the existing route, although there are no community facilities associated with these properties. Clements Wood is an area of open space situated close to the east of the existing A8, there may be a small loss of habitat to this site, however this will not affect the integrity or access to this site. The overall effect on Community Assets would be *Neutral.*

Two residential and one derelict property would be demolished for Route C1 with a further five residential properties impacted through some loss of gardens. Approximately 191 hectares of Grade 3a and Grade 2 agricultural land would be lost to the scheme, and some small areas of Grade 3b. Ten farm businesses have been identified, one would endure severe adverse impacts, two would endure moderate adverse impacts and the remaining would endure slight adverse impacts on the management, performance and future viability. 24 further agricultural units were identified where the land is currently rented out. The overall effect of Route C1 on Private Assets would be *Moderate Adverse*.

11.1.2.9 C1 Road Drainage and the Water Environment

Route C1 crosses the Larne River twice, the Glen Burn, one tributary of the Six Mile Water and five tributaries of the Larne River. This route would require new structures across the Larne River and Glen Burn, and the enlargement, replacement and/or extension of the culverts for the other watercourses. The principle impacts on these watercourses will be the potential for increased velocity and volume of road runoff, and the risk of pollution from road runoff during construction and operation.

Groundwater is known to lie close to the surface at various locations adjacent to the existing A8. Potential impacts to this resource may include alterations to natural drainage patterns due to the introduction of new road infrastructure. This route would also cross land situated within the 1:100 year floodplain.

The key impact for this route is the impact to flooding and loss of flood storage, and the new crossings of the Larne River and Glen River. The impact on the water environment has been assessed to be *Moderate Adverse,* however flood storage compensation could reduce the impacts to slight adverse.

11.1.3 C1 Cost Estimate

The Stage 2 cost estimate for Route C1 is presented in Table 11.3, full details are provided in Appendix D. The cost estimate had been developed including a contingency/risk allowance based on the Stage 2 quantified Risk Assessment, and a 20% optimism bias on construction costs and 5% optimism bias on land and compensation costs (see Section C1.3.2 in Appendix C).

Table 11.3: Route C1 Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**26,078,036**
Contractors Overheads & Profit (10%)	£	2,607,804
Sub Total	**£**	**26,685,840**
Land Costs and Compensation	£	3,402,750
Preparation, surveys, design (9%)	£	2,581,726
Supervision (5%)	£	1,434,292
Contingency/Risk Allowance	£	1,112,150
Sub Total	**£**	**37,216,758**
Optimism Bias *(20% construction, 5% land and compensation)*	£	6,932,939
TOTAL ESTIMATED COST	**£**	**44,149,697**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total estimate cost of **£44,149,697**.

11.1.4 C1 Traffic Assessment

The central growth traffic forecast for Route C1 for the design year, 2031, were developed for each of the different routes around Ballynure (Section C). The forecast traffic volumes vary depending on the choice of route around Ballynure, and therefore a range of traffic flows have been presented in Table 11.4 below.

Table 11.4: Route C1 Forecast Annual Average Daily Traffic Flows for 2031

Road Description	Direction	Annual Average Daily Traffic (AADT)	Total 2-way AADT
A8 (Ballybraken Road to B100 Ballyrickard Road)	Northbound	11,253 – 11,355	22,275 – 22,564
	Southbound	10,978 – 11,209	
B100 Ballyrickard Road	Northbound	1,785 – 1,855	3,753 - 3820
	Southbound	1,952 – 1,977	
A36 Shaneshill Road	Northbound	6,770 – 6,810	14,632 – 14,694
	Southbound	7,861 – 7,884	

11.1.5 C1 Economic Assessment

There is only one route being assessed in Section C and therefore a full economic assessment of the Section C has not been undertaken, because it is not required for route comparison and selection purposes. Although a full economic assessment of the whole scheme, Sections A, B and C, has been undertaken and is reported in Chapter 12. However, as outlined in Section 11.1.4 the total cost estimate for Route C1 is **£44,149,697.**

11.2 Route C1, Online Improvement Northern Section - WebTAG Appraisal

11.2.1 C1 Environment Objective

The appraisal of the WebTAG environmental objective has been undertaken based on the environmental assessment outlined above (Section 11.1.2) and the methodology outlined in Section C2.1 in Appendix C. The appraisal is detailed further in the separate report entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road); Stage 2 Environmental Report, 2009'*. Details of the environmental objective appraisal are provided in the AST in Section 11.2.7.

11.2.2 C1 Safety Objective

11.2.2.1 C1 Accidents Sub-Objective

There is only one route being assessed in Section C and therefore a full economic assessment of the Section C has not been undertaken, because it is not required for route comparison and selection purposes. However, a qualitative assessment has been provided which identifies any specific safety issues with this route.

A full quantitative accident assessment of the whole scheme, incorporating the preferred routes for Sections A, B and C, has been undertaken and is reported in Chapter 12.

Accidents/Safety During Operation

Initial comments from a Road Safety Auditor were obtained on Route C1 to inform the appraisal of accidents and safety during operation (for road users). The following comments were received:

- Route C1 would include nine left-in left-out accesses serving private properties and land. Depending on the layout of these junctions there would be a risk of slow moving vehicles entering or exiting these junctions causing a hazard for faster moving vehicles.
- Moss Road – Access lane from the loop road may lead to rear-end shunt collisions.
- Quarry Access – This is taken off a loop road which could be on a steep gradient. This could be a problem for laden goods vehicles and there is a risk of rear-end shunt collisions with vehicles following lorries over the bridge.

Accidents/Safety During Construction, Maintenance and Demolition

In accordance with the Construction Design and Management (CDM) Regulations 2007 the risks associated with the construction, operation, maintenance and demolition of the scheme have been considered in the assessment of route options.

This assessment identified a number of major construction activities that include the risk of injury or death if they are not appropriately planned and managed during works. The major activities identified are:

- Demolition of three buildings;
- Demolition of the existing Stewartstown, Bogtown and Lowtown bridges;
- Phased construction of three new structure (Stewartstown, Bogtown and Lowtown bridges);
- Construction of two new structures on the line of the existing A8;
- Construction work alongside existing utilities; and
- Traffic Management associated with online widening over approximately 5.9km.

Although these activities are considered to be standard construction works, consideration is still required to ensure the risks are understood and appropriately managed.

Route C1 involves the construction/replacement of five new structures and six culverts along the proposed dual carriageway. These will all require maintenance during the operation of the road, and demolition at the end of their design life.

11.2.2.2 C1 Security Sub-Objective

Route C1 would provide improved footways and pedestrian facilities along the route. However, based on the guidance in WebTAG Unit 3.4.2 and the low number of people using the facilities, the qualitative assessment score for this sub-objective would be *Neutral.*

11.2.3 C1 Economy Objective

As outlined in Section 11.1.5 a full economic assessment of Route C1 has not been undertaken. Therefore only the capital cost estimate for the scheme is presented in the Route C1 AST in Section 11.2.7. A full economic assessment of the complete scheme, incorporating the preferred routes for Sections A, B and C has been undertaken and is reported in Chapter 12.

Based on the guidance in WebTAG Unit 3.5.7, the qualitative assessment score for the Reliability sub-objective with Route C1 would be *Slight Beneficial*, with the reduced driver stress and journey times for all options as detailed in Chapter 5

11.2.4 C1 Accessibility Objective

11.2.4.1 C1 Option Values Sub-Objective

The public transport provision on Route C1 would be similar to the existing, with bus stops provided along the dual carriageway. The qualitative assessment of Route C1 on Option Values would be *Neutral* based on no changes to the availability of transport services.

11.2.4.2 C1 Severance Sub-Objective

The key area for pedestrians and cyclists along the A8 are within Bruslee and Ballynure in Sections A and B. Within Section C there are limited residential properties and community facilities. The impact on the severance sub-objective therefore would be *Neutral*.

11.2.4.3 C1 Access to the Transport System Sub-Objective

The public transport provision on Route C1 will be similar to the existing. The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low therefore the qualitative assessment of this sub-objective would be *Neutral* for Route C1.

11.2.5 C1 Integration Objective

11.2.5.1 C1 The Transport Interchange Sub-Objective

The only transport interchanges identified with Section C are the existing bus stops along the A8. The proposed scheme would provide similar facilities along the new dual carriageway and in the village and therefore the impact on this sub-objective would be *Neutral.*

11.2.5.2 C1 The Land Use Policy Sub-Objective

The qualitative assessment of the impact on land-use policy would be *Neutral*. This is based on full compliance with certain policies such as PPS 3 Access Movement and Parking and PPS 13 Transport and Land use, and with other policies such as PPS 2 Planning and Nature Conservation and PPS 6 Planning, Archaeology and Built Heritage where further design development will be required to mitigate or minimise impacts.

11.2.5.3 C1 The Other Government Policies Sub-Objective

In terms of policy documents and strategies, the A8 between Coleman's Corner and the B100 (Ballyrickard Road) is outlined in a number of regional strategic documents for improvement, such as the Regional Development Strategy 2025, the Investment Strategy for Northern Ireland 2008 – 2018, and the Investment Delivery Plan for Roads 2008. As a result, the qualitative assessment of the impact of Route C1 would be *Beneficial.*

11.2.6 C1 Supporting Analysis

11.2.6.1 C1 Affordability

The Route C1 scheme costs is reported in Section 10.1.3 with a total cost estimate of **£44,149,697** based upon current (Q1 2009 – January to March) prices. The affordability of the scheme will be assessed by Roads Service in view of the wider Strategic Road Improvements programme.

11.2.6.2 C1 Practicality

The Practicality of Route C1 is reported in the Section 11.1.1.6 of the engineering assessment.

11.2.6.3 C1 Public Acceptability

The outcome of the public consultation event is summarised in Section 6. The public consultation event showed there is generally public support for the A8 improvements. No further questions were asked in relation to Section C.

11.2.7 C1 Appraisal Summary Table

The appraisal for Route C1 is summarised and presented in an AST, overleaf.

Table 11.5: Route C1 Appraisal Summary Table

Route C1, Route C1, Online Improvement Northern Section				**Problems:** Demolition of 2 properties and 1 derelict building, impact on the setting of a schedule historic monument and loss of industrial heritage site.	**Total cost estimate:** £44,149,697
Objective	***Sub-Objective***	***Qualitative Impacts***		***Quantitative Assessment***	***Assessment***
Environment	Noise		Estimated Population Annoyed (Without Scheme): 50 Estimated Population Annoyed (With Scheme):57		Net Noise Annoyance: 7
	Local Air Quality	There are a total of 276 properties within 200m of the proposed route corridor. In both 2016 and 2031, 148 properties are predicted to experience deterioration in PM_{10} and NO_2 concentrations when compared to the do-minimum scenario, however, 128 properties are predicted to experience an improvement.		The net change for NO_2 would be +74 for 2031, with +33 for PM_{10} and +29 for $PM_{2.5}$.	276 properties within 200m
	Greenhouse Gases	Slight increase in greenhouse gases			Slight Adverse
	Landscape	The slight adverse impact will be restricted to the immediate road corridor and residential land, hedgerow and hedgerow trees will be lost at various points along the route. There will be a slight adverse visual intrusion by a new bridge structure and new road crossing at Deerpark Road / Park Road junction.			Slight Adverse
	Townscape	There are likely to be physical and visual impacts on hamlets and discrete farmhouses. This option will require residential properties to be lost.			Slight Adverse
	Heritage/ Historic Resources	Areas on either side of the road have been disturbed by the road, the railway and subsequent development. Route C1 will pass close to the location of the regionally important and protected Lowtown Rath, moderately impacting upon its setting. The former Headwood Station Site is located directly within the line of the route. This building has been converted into a dwelling but still retains much of its original form. The route will cross over the site of the former station thereby removing it and a local heritage feature.			Moderate Adverse
	Biodiversity	Nine new or extended crossings of watercourses are required and there will be a moderate adverse impact to a number of areas of marshy grassland alongside the existing carriageway. Other impacts will include loss of field boundaries and hedgerow trees. The possible presence of badgers, birds and salmonid species along the route could result in adverse impacts on these species, of most significance are potential moderate adverse impacts to otter and bats.			Moderate Adverse
	Water Environment	Route C1 widens the existing carriageway and crosses nine watercourses including two crossings of the Inver River, a crossing of the Glen Burn and crossing of one tributary of the Six Mile Water and five tributaries of the Inver River. The route will require new or widened crossings of these watercourses. This option would cross land situated within the 1:100 year flood extent of the Inver River and their associated tributaries.			Slight Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclist. New junctions will also provide safe crossing places for pedestrians, cyclists and equestrians.			Slight Beneficial
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak times. All these factors			Moderate

		would contribute to an enhanced driving experience along this section of the A8.		Beneficial
Safety	Accidents	Improvement on existing single carriageway. 9 No. left-in left-out accesses, access from Moss Road and Deerpark Road junction loop roads were identified by a Road Safety Auditor as potential safety hazards.		Slight Beneficial
	Security	Route C1 would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		Neutral
Economy	Public Accounts		2009 Q1 cost estimate £44,149,697	Total cost estimate £44,149,697
	Transport Economic Efficiency: Business Users			Not Assessed
	Transport Economic Efficiency: Consumer Users			Not Assessed
	Reliability	Reduced driver stress and improved journey times would be expected with this option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with new bus stops provided along the dual carriageway.		Neutral
	Severance	There are limited residential properties and community facilities and therefore the widening of the A8 is unlikely to have any impact.		Neutral
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2 and PPS 6.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

12 Route Comparison and Discussion

This chapter provides a distillation of the Stage 2 route option assessment and appraisal findings presented in Chapters 9 to 11, and provides a comparison of the options considered for each section, culminating in the recommendation of an option preference for each section.

This option comparison is summarised in accordance with the five key objectives for transport: Environmental, Safety, Economy, Accessibility and Integration, together with the supporting analysis of Affordability, Practicality and Public Acceptability. A high level summary of the Engineering and Traffic issues are also provided below. For each objective within each section, the best performing option is identified.

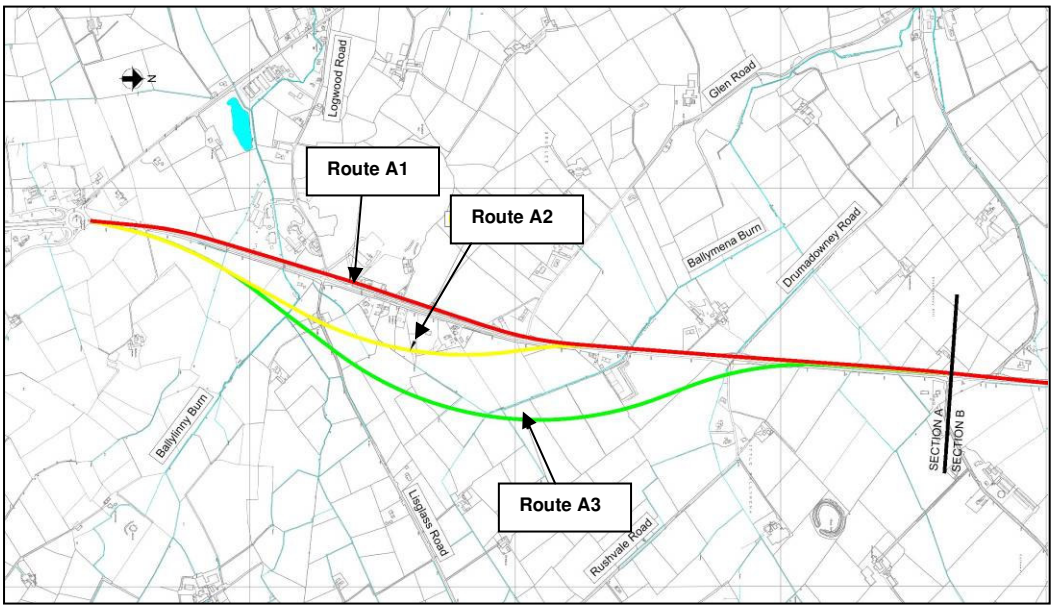
The balance of all this information, including the magnitude of any residual impacts, has been used to give an objective recommendation for the 'Preferred Route' for the A8 Dualling, based on the project team's professional judgement. This takes into account all factors, not just the economic worth, and takes account of all impacts, both monetised and non-monetised, and the qualitative as well as quantitative information. This combination of the section preferences therefore forms the recommendation for the 'Preferred Route' for the whole scheme.

12.1 Section A

Section A considers the route options available at the southern end of the scheme at the small settlement of Bruslee. The proximity of residential and commercial properties to the existing A8 in Bruslee represents a major constraint for an online option. Therefore the Stage 2 Assessment has considered both online and off-line routes options. Three route options were developed as shown on Figure 12.1:

- Route A1 – Online Improvement Bruslee;
- Route A2 – Inner Eastern Bypass of Bruslee; and
- Route A3 – Outer Eastern Bypass of Bruslee.

Figure 12.1: Section A Routes



12.1.1 Engineering Assessment

There are no engineering issues which would preclude the implementation of any of the routes within Section A.

In terms of the mainline geometry, all routes have been designed, both horizontally and vertically, in accordance with DMRB TD 9/93 design standards for a design speed of 120kph (70mph) with no Relaxations or Departures from Standard. A junction strategy that retains the existing roundabout at Coleman's Corner and provides left-in left-out accesses for the remaining side roads has been implemented. However, the associated side road geometries for all three routes would require some Relaxations and Departures from Standard for the tie-in to the existing side roads.

The structural requirements for all three routes would be similar, with a single new structure provided to carry the new A8 across the Ballylinny Burn. This would be slightly more complicated for Route A1 as it would require the replacement of the existing structure, resulting in a phased construction of the new bridge to keep traffic moving.

Route A1 would follow the line of the existing A8, largely encompassing the existing road and therefore minimising the level of new road construction required. In terms of geotechnical issues, all routes are likely to encounter localised areas of poorly drained material which may need to be replaced to ensure a suitable foundation for the road. Route A1 crosses the site of an old petrol filling station in Bruslee, which is potentially a source of contaminated land.

Route A1 would require the demolition of six properties in Bruslee on the west of the existing A8, Routes A2 and A3 would demolish one property current under construction.

12.1.2 Traffic Assessment

The traffic assessment and operational capacity, for the three routes within Section A are the same. The overall scheme will deliver a major benefit in terms of improved traffic flow and congestion relief in relation to the do-minimum scenario (refer to Chapter 5). All the routes within Section A are of a similar length with similar connections to the surrounding road network they therefore provide the same level of operational performance.

12.1.3 Environment Objective

The assessment of the WebTAG Environment sub-objectives of Greenhouse Gases, Local Air Quality, Heritage and Water Environment has shown no significant differences between the route options within Section A, and therefore these sub-objectives have not influenced the determination of the option preference for this section.

The key environmental sub-objectives are deemed to be Noise, Landscape, Townscape, Biodiversity, Physical Fitness and Journey Ambience.

The noise assessment demonstrated that Route A1 would perform best, with Route A3 performing the worst. Route A1 would keep the new dual carriageway on the line of the existing A8, and therefore the increase in noise levels would be small, when compared to the forecast noise levels without the scheme. In addition, Route A1 would require the demolition of six of properties along the A8 therefore reducing the number of properties subject to an increase in noise. Route A3 would move the dual carriageway away from the existing route and therefore leads to impacts on new properties located away from the existing road.

Route A1 performs the best in terms of implications on the local landscape and character visual amenity because it follows the existing road corridor therefore minimising the impact on the surrounding landscape. Route A1 performs poorly in relation to townscape because it would require the demolition of six properties within Bruslee. Routes A2 and A3 have the least impact on Townscape because they avoid the demolition of a large number of buildings.

The principle impacts on habitats and protected species will be similar for all routes. However Route A1 is assessed to have the least impact on Biodiversity because it impacts on the least amount of greenfield land.

Route A2 and A3 perform well in terms of Physical Fitness and Journey Ambience. Both routes would remove the A8 from through Bruslee providing an improved environment for pedestrians and cyclists. Severance for pedestrians and cyclists in Bruslee would be exacerbated with Route A1, it is therefore considered to perform the worst.

In conclusion, for environment, Route A2 is considered to have the least overall impact. Route A2 would deliver the Physical Fitness and Journey Ambience benefits through a bypass of Bruslee and it is also the shortest bypass option therefore minimising the impact on the landscape and biodiversity.

12.1.4 Safety Objective

In terms of accident rates, all the options within Section A demonstrated the potential for accident savings (when compared with the do-minimum scenario), and given the magnitude of savings, all options were deemed to provide a similar level of safety performance.

A qualitative assessment based on a Road Safety Auditor's comments and the construction, maintenance and demolition risks identified during the design process, concluded that Routes A2 and A3 would result in slightly improved safety across the whole project life cycle than the other option. These routes do not require sections of parallel laneways (for access provision) which may create dazzle problems depending on the level of mitigation, and involve fewer potential construction-related risks associated with more complex online widening.

The three routes assessed within Section A are considered to perform the same in relation to Security, primarily because of improved pedestrian facilities. Therefore this sub-objective has therefore not been considered in the comparison of the routes.

Routes A2 and A3 are considered to be the best performing routes in terms of safety.

12.1.5 Economy Objective

The three routes for Section A comprise similar lengths and utilise a similar junction strategy. Therefore the economic benefits for each route have been assessed to be the same. However, each route would involve a different capital cost and for the purpose of this comparison of options, capital cost has been used as the key differentiator, and these are summarised in Table 12.1.

Table 12.1: Section A Scheme Cost Summary

	Route A1	Route A2	Route A3
Capital Cost (£million Q1 2009)	£17.0m	£16.2m	£16.1m

The higher costs for Route A1 will result in that route performing the worst, with Routes A2 and A3 giving the best economic performance. However, the differences in the scheme costs are relatively small.

12.1.6 Accessibility Objective

There is no significant difference between the routes in relation to the Options Values and Access to the Transport System sub-objectives with the qualitative assessment scoring all routes as *Neutral.*

Routes A2 and A3 perform best in relation to Severance because they realign the A8 away from the small settlement of Bruslee, reducing the hindrance to non-motorised users. Route A1 will require the demolition six buildings in Bruslee, however will leave a number of residential properties on the eastern side of the road opposite the businesses. Therefore, Route A1 is considered to perform poorly in relation to Severance.

12.1.7 Integration Objective

There is no significant difference between the three routes in relation to the Integration sub-objectives of Land Use Policy, Transport Interchange and Other Government Policies, with all routes scoring the same. Therefore the Integration Objective has not influenced the selection of an option preference within Section A.

12.1.8 Supporting Analyses

12.1.8.1 Affordability

The scheme costs for each of the three routes options considered with Section A have been presented previously in Table 12.1.

The lowest scheme cost would be Route A3, at a Q1 2009 (January to March) cost of £16.1 million. However, the range of costs between the options is considered relatively low with the most expensive options (Route A1) costing an additional £0.9 million (5%).

12.1.8.2 Practicality

Route A1 being a completely online solution within Section A would result in significant traffic management requirements, likely resulting in some disruption to the existing A8 traffic during construction and requiring the phased replacement of one existing structure. It is not considered that this would not pose a major problem to a competent contractor with a robust traffic management strategy.

However, Routes A2 and A3 would be the best performing options in terms of construction practicality because they predominately involve off-line construction and do not require the phased replacement of any existing structures.

12.1.8.3 Public Acceptability

Overall, the feedback from the Stage 1 and 2 public consultations confirmed that there is overall public support for improvements to the A8. However, there was no clear public preference for any of the routes considered within Section A. Therefore, although supporting improvements, public acceptability has not influenced the selection of an option preference within Section A.

12.1.8.4 Recommendation

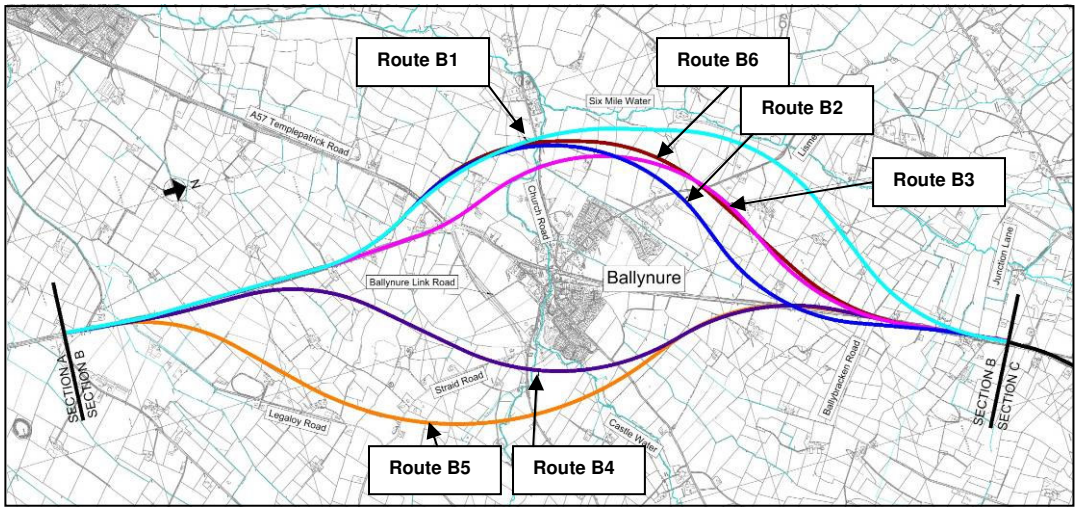
Based upon the Stage 2 assessment of the three route options within Section A, it is recommended that the option preference is Route A2. This is based on the route having the smallest impact on Bruslee through reductions in severance and demolition of properties (alongside Route A3) and the least environmental impact. In addition, the route has one of the lowest cost estimates and therefore has the best economic performance.

12.2 Section B

Section B considers the bypass route options available at the village of Ballynure. The Stage 2 Assessment has considered both eastern and western bypass routes options. Six route options were developed as shown on Figure 12.2:

- Route B1 – Outer Western Bypass of Ballynure;
- Route B2 – Inner South-western Bypass of Ballynure;
- Route B3 – Inner North-western Bypass of Ballynure;
- Route B4 – Inner Eastern Bypass of Ballynure;
- Route B5 – Outer Eastern Bypass of Ballynure; and.
- Route B6 – Hybrid Inner Western Bypass of Ballynure.

Figure 12.2: Section B Routes



12.2.1 Engineering Assessment

There are no engineering issues which would preclude the implementation of any of the routes for Section B.

In terms of the mainline geometry, all routes have been designed, both horizontally and vertically, in accordance with DMRB TD 9/93 design standards for a design speed of 120kph (70mph) with no Relaxations or Departures from Standard. A junction strategy that provides one full grade separated junction at the A57 (Templepatrick Road)/ B58 (Carrickfergus Road) intersection, two compact grade separated junctions and bridge connections across the dual carriageway for two side roads around Ballynure has been implemented. However, the associated side road geometries for all six routes would require some Relaxations and Departures from Standard.

Route B5 requires the greatest number of new structures including five road bridges and two watercourse bridges. The routes to the west of Ballynure (Routes B1, B2, B3 and B6) require the least number of structures; however include a larger structure across Ballynure Water and Church Road. All routes involve the construction of new bridges over the line of the existing carriageway. However, Route B3 would involve the construction of a new bridge in the immediate vicinity of the heavily trafficked A57 (Templepatrick Road) roundabout.

In terms of geotechnical issues, all routes are likely to encounter localised areas of poorly drained material. This may need to be replaced to ensure a suitable foundation for the road. In addition all the routes are likely to encounter basalt bedrock where they are in cutting. However, the main geotechnical difference between the routes is to the west of Ballynure (for routes B1, B2, B3 and B6) where they may intersect the groundwater flowing through the fractured basalt bedrock requiring additional drainage measures.

Routes B2, B3 and B4 would require the demolition of a single property around Ballynure, Route B1, B5 and B6 would take land from residential properties however would not require their demolition.

12.2.2 Traffic Assessment

A summary of the results of the traffic assessment, in terms of traffic flow, of the six routes for Section B is presented in Table 12.2.

Table 12.2: Section B Traffic Assessment Summary

	Route B1	Route B2	Route B3	Route B4	Route B5	Route B6
Do-Minimum without dual carriageway *(Total 2-way AADT)*	22,559					
Do-Minimum without dual carriageway *(No. HGVs 2-way AADT)*	3,158					
New A8 (bypass to east or west) *(Total 2-way AADT)*	22,010	22,010	22,010	20,525	20,420	22,010
Remaining A8 (through Ballynure) *(Total 2-way AADT)*	2,422	2,422	2,422	3,123	3,136	2,421
Remaining A8 (through Ballynure) *(No. HGVs 2-way AADT)*	48	48	48	718	972	48

The traffic assessment shows that the the western bypass options (Routes B1, B2, B3 and B6) remove a greater amount of traffic, particularly HGVs, from the village of Ballynure. The eastern bypass options (Routes B4 and B5) improve the situation dramatically in relation to the do-minimum scenario and remove cars and light goods vehicles passing through the village, however they fail to remove the HGVs which take the shorter route through the village.

12.2.3 Environment Objective

The assessment of the WebTAG Environment sub-objectives of Noise, Greenhouse Gases, Local Air Quality, Townscape, Physical Fitness and Journey Ambience has shown that there are no significant differences between the route options within Section B, and therefore these sub-objectives have not influence the determination of the option preference for this section.

The key environmental sub-objectives are deemed to be Landscape, Heritage, Biodiversity and Water Environment.

In terms of the local landscape and visual amenity all routes are considered to be similar, although the landscape to the east of Ballynure is considered to have a greater capacity to accommodate the proposed dual carriageway. Therefore Routes B4 and B5 are considered to have the least impact.

In terms of the Heritage/Historic Resources, Routes B1, B3 and B6 would have the least impact on known recorded historic resources. However, as with all options, there would be a residual risk of uncovering unknown archaeology during the construction works.

Route B3 would require the diversion of a section of Ballynure Water, an environmentally sensitive watercourse. This is considered to have a severe impact on Biodiversity through the impact on this habitat. The remaining routes are all considered to perform similar in terms of Biodiversity.

In terms of the Water Environment Routes B2, B4, B5 and B6 would have the least impact. Route B3 would have a severe impact through the diversion of Ballynure Water. In addition, Route B1 would perform poorly due to the proximity of the route to the Six Mile Water and the potential impact on natural drainage patterns.

In conclusion, Routes B2, B4, B5 and B6 are considered to have the least overall impact on the environment. Routes B1 and B3 are considered to have a greater impact on the environment predominately because of their severe impact on the Water Environment and Biodiversity.

12.2.4 Safety Objective

In terms of accident rates, all the options within Section B demonstrated the potential for accident savings (when compared with the do-minimum scenario), and given the magnitude of savings, all options were deemed to provide a similar level of safety performance.

The qualitative assessment based on a Road Safety Auditor's comments and the construction, maintenance and demolition risks identified during the design process, concluded that Routes B1, B2, B3 and B6 would result in slightly improved safety. The main difference identified in the Safety Auditor's comments related to the very constrained junction layout at Ballybraken Road associated with the eastern bypass routes (Routes B4 and B5). The constrained geometry associated with the junction and the limited visibility represent a safety concern because of the potential for queuing vehicles to suffer rear-end shunts. In addition Routes B4 and B5 remove less traffic from Ballynure (see Section 12.2) and therefore will not deliver the same level of accident savings as the western bypass options (Routes B1, B2, B3 and B6).

The three routes assessed within Section A are considered to perform the same in relation to Security, primarily because of improved pedestrian facilities. Therefore this sub-objective has therefore not been considered in the comparison of the routes.

Routes B1, B2, B3 and B6 are considered to be the best performing routes in terms of safety.

12.2.5 Economy Objective

The economic assessment of the routes within Section B has been based upon assuming a constant route within Sections A and C (Route A2 and C1) and varying the Section B routes to ascertain the economic impact. This has provided overall scheme economics for each different route within Section B to facilitate the comparison. A summary of the results of the economic assessment of the six routes is presented in Table 12.3.

Table 12.3: Section B Economic Assessment Summary

	Route B1	Route B2	Route B3	Route B4	Route B5	Route B6
Public Accounts – Central Government Funding (PVC)	£82.3m	£79.3m	£80.2m	£75.3m	£73.5m	£78.6m
Business User Benefits (PVB)	£78.7m	£78.7m	£78.7m	£64.0m	£64.4m	£78.7m
Consumer User Benefits (PVB)	£37.8m	£37.8m	£37.8m	£32.3m	£33.7m	£37.8m
Other Benefits (accidents + carbon)	£2.4m	£2.4m	£2.4m	£0.1m	£0m	£2.4m
Reliability	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial	Slight Beneficial
Wider Economics Impacts	n/a	n/a	n/a	n/a	n/a	n/a
Net Present Value (NPV)	**£36.6m**	**£39.6m**	**£38.7m**	**£21.1m**	**£24.5m**	**£40.3m**
Benefit to Cost Ratio (BCR)	**1.45**	**1.50**	**1.48**	**1.28**	**1.33**	**1.51**

It can be seen that the best performing route options, in terms of minimising cost to Central Government, is Route B5 on the basis that it has the lowest scheme cost.

The best performing option in terms of the transport economic efficiency benefits to business and consumer users would be the western bypass options (Route B1, B2, B3 and B6).

From the summary statistics of NPV and BCR for the overall economic performance, the best performing option is Route B6 with a NPV of £40.3 million and a BCR of 1.51, but it is considered there is little difference between Route B6 and the other western bypass options (Route B1, B2, B3). Routes B4 and B5 are the cheapest routes, but deliver only approximately 60% of the benefits of the western routes. In conclusion, Routes B6 is the best performing route in terms of overall economic performance.

12.2.6 Accessibility Objective

There is no significant difference between the Section B routes in relation to the Options Values and Access to the Transport System sub-objectives with the qualitative assessment scoring all routes as *Neutral.*

*A*ll routes will reduce the amount of traffic going through Ballynure therefore reducing the hindrance to non-motorised users and severance. Routes B1, B2, B3 and B6 are considered to perform slightly better because they will reduce the amount of through traffic in Ballynure by a greater amount than Routes B4 and B5.

12.2.7 Integration Objective

There is no significant difference between the six routes in relation to the Integration sub-objectives of Land Use Policy, Transport Interchange and Other Government Policies, with all routes scoring the same. Therefore the Integration Objective has not influenced the selection of an option preference within Section B.

12.2.8 Supporting Analyses

12.2.8.1 Affordability

The scheme costs for each of the six routes options considered with Section B are presented in Table 12.4.

Table 12.4: Section B Scheme Cost Summary

	Route B1	Route B2	Route B3	Route B4	Route B5	Route B6
Capital Cost (£million Q1 2009)	£57.7m	£54.0m	£55.0m	£49.5m	£47.9m	£52.9m

It can be seen that the routes with the lowest scheme cost would be Routes B5 and B4, at a Q1 2009 (January to March) cost of £47.9million and £49.5 million respectively. The most expensive would be Route B1 costing an additional £9.8 million, and then Route B3 costing an additional £7.1 million.

12.2.8.2 Practicality

Route B3 remains on the line of the existing A8 to the A57 (Templepatrick Road) and B58 (Carrickfergus Road) roundabout, where a full grade separated junction is proposed. The construction of this junction would result in significant traffic management requirements, phased construction of a new bridge and disruption to the existing A8, A57 and B58 traffic during construction.

Route B4 passes to the east of Ballynure and crosses the B58 (Carrickfergus Road) in the region of the existing Straid Road junction and Castle Water, the route also goes through a cluster of residential properties along the Straid Road. At this location a new full grade separated junction is proposed and the construction of the junction will result in significant traffic management requirements and phasing of the works to minimise disruption to the A8 and A57 traffic and local residents.

Routes B1, B2, B5 and B6 are the best performing routes in terms of construction practicality, although it is considered that none of the route options would pose any major problems to a competent contractor with a robust traffic management strategy.

12.2.8.3 Public Acceptability

Overall, the feedback from the Stage 1 and 2 public consultations confirmed that there is an overall public support for improvements to the A8. However, there was no clear public preference for either of the routes considered within Section B. Therefore, although supporting improvements, public acceptability has not influenced the selection of a 'Preferred Route' within Section B.

12.2.8.4 Recommendation

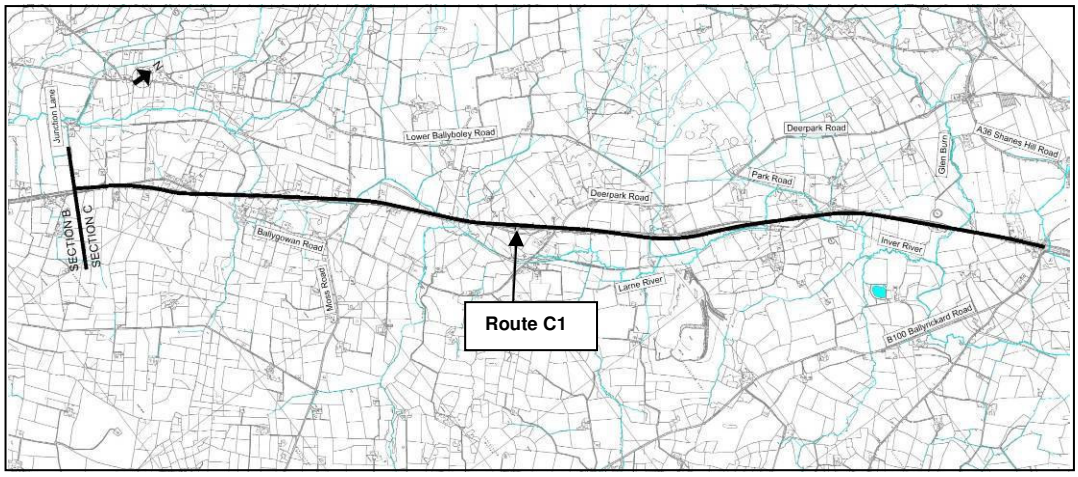
Following the Stage 2 assessment of the six routes within Section B, the recommended route is Route B6. This is based on the route delivering the best economic performance, the least environmental impact (alongside other routes), the greatest reduction in through traffic in Ballynure delivering a safer and better environment within the village, and the avoidance of any residential properties.

12.3 Section C

Section C considers the route options to the north of Ballynure. The Stage 1 recommended corridors are relatively narrow for this section of the scheme and allow for an online solution with the potential for several short off-line sections to avoid certain constraints. A number of sub-routes were considered and discounted at an early stage, see Section 7.6.2, and therefore the Stage 2 Assessment has only considered one route:

- Route C1 - Online Improvement Northern Section.

Figure 12.3: Section C Route



12.4 Achievement of Key Objectives and Amelioration of Problems

There is no differentiation between the route options as they all achieve the key objectives set for this A8 improvement scheme as follows:

- All options provide a dual carriageway along this section of the A8;
- All options reduce the traffic congestion at peak times and in doing so reduce journey times and improve journey time reliability; and
- All options provide a dual carriageway, with a reduced number of side road junctions and direct access, which will improve safety.

There is no differentiation between the routes options in terms of 'amelioration of problems' as all routes would provide a significant improvement to the existing traffic conditions addressing the main problems identified by the local people, local transport providers and regional and local authorities. This issue has therefore had not influence over the selection of the 'Preferred Route'.

12.5 Recommendation for the 'Preferred Route'

It is recommended that the 'Preferred Route' for the A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road) is the combination of **Routes A2, B6, C1**. The quantitative accident assessment of this combination of routes is summarised in Table 12.4, and provides a comparison of the do-minimum accident statistics based on either the observed accident data or default COBA accident rates for a single carriageway road, with the calculated COBA accident rates for the proposed dual.

Table 12.5: Preferred Route Comparison with Do-Minimum Accident Statistics

	Number of Personal Injuries				Total Number of Personal Injury Accidents	Accident Benefits (£000)
	Fatal	Serious	Slight	Total		
Accident Savings based on RTC rates	9	18	-242	-215	-142	5,022
Accident Savings based on COBA rates	39	202	940	1,150	702	56,733

Table 12.5 shows that the overall scheme is beneficial and reduces the overall accident costs and numbers of fatal and serious accidents in both scenarios. However, the analysis indicates that the upgrading of the A8 from existing single carriageway to dual carriageway

would result in an increase in the number of slight injury accidents when compared to a do-minimum scenario using the RTC data. As outlined in Section 5.2 the number of slight accidents is significantly less than would be expected which may suggest that slight accidents are not being reported. In practice, it is likely that upgrading the A8 to dual carriageway will result in a reduction in the number of accidents compared to a single carriageway, as demonstrated by the comparison against the COBA rates for a single carriageway. The analysis has demonstrated that their will be monetary accident benefits, however the exact accident savings in the future is difficult to quantify and therefore the assessment has been based on the lower estimate of accident benefits to give a conservative assessment.

The total scheme costs for the combined route are summarised in Table 12.5, and the scheme economics in Table 12.6. In addition an AST for the full length of the scheme is provided in Table 12.7.

Table 12.6: Preferred Route Stage 2 Cost Estimate

	Cost (£)	
Construction Cost	**£**	**67,115,351**
Contractors Overheads & Profit (10%)	£	6,711,535
Sub Total	**£**	**73,826,886**
Land Costs and Compensation	£	7,730,250
Preparation, surveys, design (9%)	£	6,644,420
Supervision (5%)	£	3,691,344
Contingency/Risk Allowance	£	3,484,240
Sub Total	**£**	**95,377,140**
Optimism Bias *(21% construction, 5% land and compensation)*	£	17,915,891
TOTAL ESTIMATED COST	**£**	**113,293,031**

The cost estimate has been developed based on Q1 2009 (January to March) rates, which shows a total estimate cost of **£113,293,031.**

Table 12.7: Preferred Route Economic Assessment Summary

	Preferred Route
Public Accounts – Central Government Funding (PVC)	£78.6m
Business User Benefits (PVB)	£78.7m
Consumer User Benefits (PVB)	£37.8m
Other Benefits (accidents + carbon)	£2.4m
Reliability	Slight Beneficial
Wider Economics Impacts	n/a
Net Present Value (NPV)	**£40.3m**
Benefit to Cost Ratio (BCR)	**1.51**

The economic assessment showed a NPV of £40.3 million and a BCR of 1.51 for the whole scheme.

Table 12.8: Preferred Route Appraisal Summary Table

Route A2/B6/C1,		**Description:** The route would provide an online solution for the majority of the scheme, with bypasses around the village of Ballynure and small settlement of Bruslee. The online section of the route would involve a mixture of widening to the east and west of the existing carriageway to minimise impact on properties and land.	**Problems:** loss of agricultural land, and impact on landscape, heritage and biodiversity.	**Present value of costs to public:** £78.6million
Objective	***Sub-Objective***	***Qualitative Impacts***	***Quantitative Assessment***	***Objective***
Environment	Noise		Estimated Population Annoyed (Without Scheme): 244 Estimated Population Annoyed (With Scheme): 273	Net Noise Annoyance: 31
	Local Air Quality	There are a total of 889 properties within 200m of the proposed route corridor. In 2016, 276 properties are predicted to experience deterioration in NO_2 concentrations and 306 properties for PM_{10}, when compared to the do-minimum scenario. In 2016, 285 properties are predicted to experience an improvement in NO_2 concentrations when compared to the do-minimum, together with 592 properties for PM_{10}.		889 properties within 200m
	Greenhouse Gases		Change in Carbon Emissions over 60 year appraisal period (tonnes): 62,379	£2.6m
	Landscape	The route would impact upon several Local Character Areas. The off-line section around Ballynure would have an impact on the distinct landscape and visual appeal. The impact of the online section would be restricted to the immediate road corridor.		Moderate Adverse
	Townscape	There are likely to be impacts on discrete farmhouses / fragmentation of landholdings. Where the route passes Ballynure there is a potential slight adverse impact on setting for townscape and industrial landscape features of cultural significance. The route will require residential properties to be lost.		Slight Adverse
	Heritage/ Historic Resources	The route would pass close to the protected Lowtown Rath and Souterrrain, and impact directly on the Headwood Station Site. The route also crosses over Hillis Bridge which dates to the early 19th Century, although it will not be lost to the scheme. The route also runs through areas of greenfield that would have archaeological potential.		Moderate Adverse
	Biodiversity	There will be a moderate adverse impact to the Ballynure Water and Larne River and its associated habitats due to the construction of new river crossings. Other habitats affected are hedgerows and marshy grassland. The possible presence of badgers, birds and salmonid species along the route could result in adverse impacts on these species, of most significance are potential adverse impacts to otter and bats.		Moderate Adverse
	Water Environment	The route crosses the major watercourse of Ballynure Water and the Larne River and numerous other minor watercourses. The route will require a new structure across Ballynure Water and two new structures across the Larne River, and the enlargement, replacement and/or extension of the other culverts. This route will cross land within the 1:100 year floodplain and therefore will impact upon the extent of flood storage.		Moderate Adverse
	Physical Fitness	The overall effect on pedestrians and cyclists would be moderate beneficial as the proposed carriageway would include formal provision for pedestrians and cyclists. Removing through traffic from the settlement of Ballynure and Bruslee would increase pedestrian and cyclist safety, activity and connectivity with community facilities.		Moderate Beneficial
	Journey Ambience	There would be a net improvement in Journey Ambience through a reduction in travel times along the A8, alleviation of traffic congestion, particularly during peak. All these factors would contribute to an enhanced driving experience along this section of the A8, and an improved		Moderate Beneficial

		driving experience within Ballynure village.		
Safety	Accidents	Improvement on existing single carriageway. 2 No. left-in left-out access, tight radius bend on Calhame Road and T-junction on Green Road were identified by a Road Safety Auditor as potential safety hazards.	Accident Benefits = £5.0m	Slight Beneficial
	Security	The route would provide improved footways and pedestrian facilities along the route. However, the number of people using the facilities is low.		
Economy	Public Accounts		Central Government PVC = £ 78.6m	PVC = £78.6m
	Transport Economic Efficiency: Business Users		Business Users PVB = £78.6 million	PVB = £78.6m
	Transport Economic Efficiency: Consumer Users		Consumer Users PVB = £37.7 million	PVB = £ 37.7m
	Reliability	The scheme would result in reduced driver stress and improved journey times with the option.		Slight Beneficial
	Wider Economic Impacts			Not Assessed
Accessibility	Option Values	The public transport provision will be similar, with new and existing bus stops provided along the dual carriageway.		Neutral
	Severance	The bypass of Ballynure and Bruslee would reduce the severance between facilities in the settlement on either side of the existing A8.		Slight Positive
	Access to the Transport System	The percentage of the residents within the scheme assessment area that do not have access to a car is considered to be very low. Bus stops on the existing A8 will be incorporated into the proposals and retained.		Neutral
Integration	Transport (Passenger) Interchange	The only transport interchanges are existing bus stops along the A8. These bus stops will be incorporated into the proposed scheme however there is little benefit to be achieved because they are currently poorly used.		Neutral
	Land Use Policy	Balance between compliance with certain policies, such as PPS 3 and PPS 15, and design development to eliminate or minimise impacts to ensure compliance with others such as PSS 2 and PPS 6.		Neutral
	Other Government Policies	Scheme included in key regional strategic documents, including the RDS 2025, the ISNI 2008 – 2018, and the IDP for Roads 2008.		Beneficial

13 Summary and Conclusions

13.1 Background and Basis of Study

The Northern Ireland Regional Development Strategy (RDS) identifies Larne as one of the five major inter-regional gateways in Northern Ireland and the Investment Strategy for Northern Ireland 2008-2018 (ISNI) and Investment Delivery Plan for Roads (IDP), includes *'opening the A5 and remaining sections of the A8 dualling schemes during the life of the strategy'* as one of the key milestones. The IDP has therefore defined the scheme to dual the remaining 14km section of the A8, between Coleman's Corner and B100 (Ballyrickard Road), to be within its Preparation Pool and estimates delivery of scheme between 2013/14 to 2017/18.

A Stage 1 Assessment for this scheme was completed for the route in November 2008 and recommended two corridors should be taken forward for more detailed assessment.

This Stage 2 assessment provides a 'route' appraisal for the scheme and identifies the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with different routes that have been developed within the Stage 2 corridors. The study has been undertaken in accordance with the *Design Manual for Roads and Bridges* (DMRB), *TD 37/93 – Scheme Assessment Reporting,* and the *New Approach to Appraisal* (NATA), which is the recommended basis for the appraisal of road schemes throughout the UK.

13.2 Baseline Conditions

The study area comprises the 14km section of the A8 between the Coleman's Corner roundabout (junction with the B95, Hillhead Road) and the B100 (Ballyrickard Road). The existing road is a single carriageway with 17 side road junctions.

There are limited engineering constraints within the study area. These include:

- 11 watercourse structures/ bridges, four of which cross main watercourses and the remainder are smaller culvert-type structures;
- A range of utility services mainly running along the road, including water, gas, electricity and telecommunications; and
- Variable ground conditions comprising glacial till, which is thin and discontinuous in places and is often soft.

The study area is rural in nature, interspersed by farmsteads and isolated dwellings, minor roads and agricultural fields. The main features of the study area are the A8 road itself and the settlements of Bruslee and Ballynure which are situated along the line of the A8.

13.3 Traffic Assessment

SATURN traffic modelling was undertaken for this study and a 2008 base year model was developed. Forecast traffic models were then developed for the forecast years of 2016 (theoretical year of opening), 2023 and 2031 (the design year). Traffic forecasts were produced for a do-minimum scenario (without the scheme) and the do-something scenarios (with the scheme in place).

Using a DMRB congestion reference flow (CRF) assessment the existing road was shown to be currently operating at 67% of its theoretical capacity, which would rise to 90% by the design year 2031. Improving the road to dual carriageway standard would increase its capacity such that it would operate at 40% of its capacity in 2031.

Between 2004 and 2007, 43 road traffic accidents were recorded. This accident rate is low compared to average annual accident rates for a single carriageway, but the number of fatal accidents recorded was nearly 50% higher than would be expected. Given this substantial

difference compared to expected rates, there is uncertainty over the validity of the recorded accident data for this section of road.

It is proposed to rationalise the number of junctions along this section of road to better suit the safety and design requirements of a high speed dual carriageway.

13.4 Consultation

Public and stakeholder consultation has continued throughout Stage 2. A Public Exhibition was held to present the Stage 1 recommendations and seek public feedback including preferences over options.

There was a majority of public support for the A8 improvement scheme but no clear preference on whether a bypass should be provided for Bruslee and which option should be adopted around Ballynure.

13.5 Stage 2 Routes Considered

A range of routes were developed, based upon the recommended corridors from Stage 1. The assessment split the scheme into three sections which enabled a comparison of the route options within each section. The 'Preferred Route' for the overall scheme would therefore be an amalgamation of the option preference for each sections. The three sections considered were:

- Section A, Bruslee Section – Coleman's Corner Roundabout to Calhame Road;
- Section B, Ballynure Section – Calhame Road to Junction Lane; and
- Section C, Northern Section – Junction Lane to B100 (Ballyrickard Road).

Three route options were developed in Section A, six routes within Section B and a single route for Section C.

13.6 Stage 2 Assessment

The Stage 2 assessment of the three route options within Section A recommended Route A2 as the option preference. This was based on having the smallest impact on Bruslee through reducing severance and minimal demolition of properties (as was also the case for Route A3), but Route A2 had the least environmental impact. The route also benefitted from a low cost estimate and therefore performed well with regard to economics. However, Route A2 would require the demolition of a single property that is currently under construction..

For Section B, the recommended route was Route B6. This was based on:

- Best economic performance;
- Least environmental impact (alongside other routes);
- Greatest reduction in through-traffic in Ballynure;
- Delivering a safer environment within the village; and
- No direct impact upon any residential properties.

Only one route option (Route C1) was developed for Section C, although a number of sub-routes were considered and discounted at an early stage. Route C1 provides an online solution and involves widening to the east and west of the existing carriageway to minimise the impact on adjacent properties and land.

13.7 Recommendation for the 'Preferred Route'

The recommendation of this Stage 2 assessment for the A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road) is that the 'Preferred Route' for the

scheme, to be taken forward into the detailed Stage 3 assessment, would be an amalgamation of Routes A2, B6 and C1.

The preferred route has been estimated to have a total cost of £113,293,031 (based upon Q1 2009 pricing indices), including land. The route would directly impact upon 3 residential properties and 2 other buildings requiring their demolition.

The recommendations of this study have been based on the project team's professional judgement and the preferred corridor is considered to deliver the best overall performance when assessed against the Government's transport assessment criteria.

Appendix A

Existing Engineering and Environmental Constraints

A1 Existing Engineering Conditions

This Chapter provides a broad engineering assessment of the existing A8 road between the Coleman's Corner roundabout and the B100 (Ballyrickard Road) junction. The assessment considers the following areas:

- Description of route;
- Review of highway geometry;
- Review of existing structures;
- Water quality and drainage;
- Public and private utility services;
- Carriageway lighting;
- Road pavement; and
- Geology and soils.

For consistency of reporting, all sections describe the existing road corridor on a south to north basis.

Drawing numbers A8-HWY-001 and 002 (Appendix A) are 1:10,000 scale plans of the study area and illustrates the existing road and surrounding area. The plans have been annotated to highlight the key engineering constraints and features along the corridor. These drawings are referred to in the following text.

A1.1 Route Description

The A8 provides part of the main road link between Belfast and Larne. The section of the A8 under assessment is the 14km section between the Coleman's Corner roundabout (junction with the B95, Hillhead Road) and the junction with B100 (Ballyrickard Road) on the outskirts of Larne.

The existing route is rural in nature and passes through an agricultural setting. This is prevalent to both sides of the road. This section of the A8 bisects the small settlement of Bruslee, which is situated at the southern end of the route and also the village of Ballynure, which is situated towards the middle of the study area.

The A8 from Coleman's Corner to Ballynure runs in a south to north direction passing between the town of Ballyclare (to the west) and the village of Straid (to the east). However, both settlements are located in excess of 1.5km away from the road. To the north of Ballynure, the A8 runs approximately in a southwest to northeast direction to the outskirts of Larne.

The A8 to the south of the Coleman's Corner roundabout has recently been upgraded to dual carriageway standard. This dual carriageway utilises a combination of roundabouts and all-movement priority junctions for connection to side roads and provides left-in left-out access to fronting properties and some minor local roads. The dual carriageway terminates at the Coleman's Corner roundabout where the A8 downgrades to a single carriageway road.

This is the southern limit of the study area.

From the Coleman's Corner roundabout heading north, the first 700m of the road passes through an agricultural or farm land setting. The topography is relatively flat on both sides of the road. There are a number field accesses to both sides of the road, but no residential or business accesses over this section.

The A8 then passes through the small settlement of Bruslee, where it forms a junction with Logwood Road and Lisglass Road. Through Bruslee there are several residential properties that front on to the A8 on both sides of the road; these are setback between 5m and 15m from the edge of the carriageway. There are also three commercial sites lying to the west of the road: Logwood Plant Centre, East Antrim Metals and Fabrications and Bruslee Recycling Centre. Access to the East Antrim Metals and Fabrications and the Recycling Centre are directly from the A8, while the main access for the Logwood Plant Centre is from the adjacent Logwood Road. The waste recycling centre is on the site of an old landfill site which extends away from the A8 to the west.

For the next 2.0km, the topography is fairly flat, passing through agricultural land. Over this section the A8 forms five at-grade priority junctions with local side roads. There are also farm accesses and a small number of residential properties uniformly distributed on both sides of the A8. Typically the properties are set back approximately 30m from the edge of the A8.

For the next 1.3km, on the approach to Ballynure, the A8 drops downhill and widens out to provide a climbing lane for southbound traffic. A shared-use footway/cycleway is provided on the eastern side of the road for the length of the climbing lane. In this section, there are also a number of farm and residential accesses connecting directly onto the A8. At the bottom of the hill the A8 forms a 4-arm, at-grade roundabout with the A57 (Templepatrick Road) and the B58 (Carrickfergus Road).

The A8 then makes a relatively sharp right-hand bend, before reaching the village of Ballynure. As the A8 passes through Ballynure there are two priority junctions with side roads; the first with Main Street, and the second with Lismenary Road and Riverside/Castle Road. The A8 is locally widened to provide ghost islands for right turning traffic at these junctions. Within Ballynure pedestrian crossing facilities are provided across the A8 using pedestrian refuge islands. A pedestrian underpass also exists which forms part of the structure which takes Ballynure Water under the A8. There are several properties adjacent to the A8 in Ballynure; these are set back between 5m and 15m from the road edge. There is also a petrol filling station and restaurant that have access directly on to the A8 at the northern end of the village.

Heading north out of Ballynure the A8 widens to provide a climbing lane for northbound traffic. Over the length of the climbing lane, a shared-use footway/cycleway is provided on the eastern verge. The A8 passes to the east of a group of properties, near the southern end of the climbing lane, that front onto the road and are setback approximately 8m from the road edge. The surrounding landscape becomes more open and rural with the agricultural land on both sides of the road.

The climbing lane terminates at the junction with Ballybraken Road, and at this point the A8 reduces to a standard single carriageway width. Approximately 250m north of the Ballybraken Road junction the A8 passes a farm complex on the eastern side. The closest building is set slightly above the level of the road behind a small retaining wall approximately 3m from the edge of the carriageway.

Over the next 2km the A8 forms priority junctions with the side roads of Ballygowan Road, Moss Road and Deerpark Road. Throughout this section there are several residential properties and field accesses. Of particular note, approximately 180m north of the Moss Road crossroads is a residential property on the east of the A8 positioned tight to the back of the road boundary.

North of the junction with Deerpark Road, the A8 drops in elevation and aligns alongside the Larne River, before passing approximately 400m to the east of the Loughside Quarry. The A8 continues through the river valley, crossing the river twice in the space of 350m immediately prior to the Park Road junction.

From the Park Road junction the alignment of the final 1.3km of the road (within the study area) is relatively straight and the study area terminates at the junction where the A8 meets the B100 (Ballyrickard Road). Over this section, the A8 passes between the Lowtown Schedule Historic Monument and a residential property (approximately 650m before the B100 (Ballyrickard Road).

This is the northern limit of the study area.

Beyond the B100 (Ballyrickard Road), the A8 becomes a dual carriageway and extends a further 1.2km until it reaches the Millbrook roundabout. There are several residential properties on this section and a junction with the A36. Along this section wide central reserves are provided which allow for the provision of a full movement priority junction with the A36.

A1.2 Highway Geometry

A1.2.1 Horizontal alignment

With the exception of through the village of Ballynure, the A8 is derestricted and is therefore subject to the national speed limit of 60mph. Through Ballynure, there is a speed limit of 40mph. In accordance with the *Design Manual for Roads and Bridges (DMRB) TD9/93,* this equates to design speeds of 100kph and 70kph respectively, and the existing road alignment has been assessed to this design standard.

In general, the A8 can be summarised as having a relatively straight alignment with large radius bends above the desirable minimum radius for the design speed. There is, however, one area where the highway is subject to reasonably tight horizontal radius. This is between the A57 (Templepatrick Road) roundabout and Ballynure, where the road undertakes a tight right-hand bend of approximately 330m radius. In this location the speed limit is 40mph, so the radius is one-step below desirable minimum for the corresponding 70kph design speed.

A1.2.2 Vertical Alignment

The A8 route passes through a number of shallow river valleys and therefore largely consists of gentle gradients with varying crest and sag curves as the route crosses the valleys. The existing vertical alignment is considered to be of a reasonable standard. However, there are a number of sections where the vertical geometry is below the desirable minimum for the design speed of this road.

The majority of the route is subject to the national speed limit of 60mph (100kph), and an assessment of the existing vertical curvature shows that at five locations the vertical alignment is one step below desirable minimum. However, in the vicinity of the Moss Road junction the existing vertical geometry is two steps below desirable minimum.

A1.2.3 Existing Junctions

The A8 has 17 separate side road junctions along its length. Of these 18 junctions, three are considered to be key junctions as these cater for significantly higher levels of traffic than the others. The three key junctions are listed below.

A1.2.3.1 Coleman's Corner Roundabout - B95 (Hillhead Road) and Camtall Road Roundabout

This junction is located at the southern-most end of the study area. The junction comprises a 5-arm, at grade roundabout and was completed in September 2004 as part of the works to dual the A8 between the B59/B90 (Doagh Road) and the B95 (Hillhead Road).

A1.2.3.2 A57 Templepatrick Road and B58 Carrickfergus Road Roundabout

This junction forms the intersection between the A8, the A57 (Templepatrick Road) and B58 (Carrickfergus Road). The junction comprises a 4-arm, at-grade roundabout which is located to the south of Ballynure. The roundabout was completed in 2005 in parallel with a new link road around the southeast of Ballynure.

A1.2.3.3 B100 (Ballyrickard Road) Junction

The junction between the A8 and the B100 (Ballyrickard Road), at the northern end of the scheme, is an at-grade priority junction. The junction is at the end of the existing single carriageway section of the A8 and is at the location where the carriageway widens to dual carriageway to the north. The junction includes ghost-island right-turn facilities which are formed by road markings to the south of the junction and the end of the central reserve to the north of the junction.

A1.2.3.4 Other Side Road Junctions & Private Accesses

In addition to the three more significant junctions outlined above the A8 also forms 15 other side road junctions, along the length of the scheme. These junctions are typically at-grade, priority junctions comprising localised carriageway widening of the A8 and associated road markings to accommodate right right-turn lanes. Five of these priority junctions, however, are simple junctions without any mainline right-turn reserves.

There are also numerous private entrances on both sides of the carriageway, including private vehicular assesses and direct field entrances. Table A.1 provides a summary of the number of existing direct accesses entering onto each side of the road.

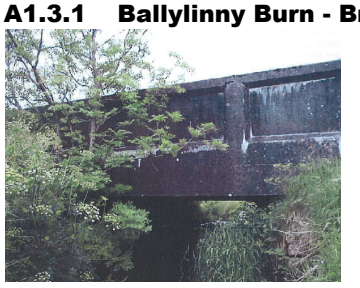
Table A.1: Summary of Private Vehicular Access

Side of A8	Farm Access	Residential Access	Commercial (Non-Agricultural) Access	Total
West	55	25	3	83
East	74	27	1	102
Total	129	52	4	

A1.3 Structures

The assessment of the existing structures has been undertaken using Principal/General Inspection Reports, Assessment Reports and as-built drawings. Assessment Reports where not available for a number of structures as noted below. The location of each structure is identified on drawing number A8-HWY-001 & 002 (Appendix A).

A1.3.1 Ballylinny Burn - Bridge No. 20050



Bridge Number 20050 is located approximately 0.5km north of the Coleman's Corner roundabout (the southern end of the scheme). The bridge comprises a single span slab structure that carries the A8 road over the Ballylinny Burn. Both the horizontal and the vertical road alignments are reasonably straight at the crossing point. No information was made available about the age of the structure, however the bridge was probably constructed over 50 years ago, and from the photograph it appears similar to Bogtown and Stewartstown Bridges (described later). No Bridge Assessment Report was available for this structure.

A1.3.2 Drumadowney Culvert near Ballynure (Bridge No. 20045)

Bridge Number 20045 is located approximately 2.0km from the southern end of the scheme, immediately to the south of the A8 junction with Rushvale Road and Drumadowney Road. The bridge is a single span reinforced concrete slab culvert that carries the A8 over a tributary of the Ballymena Burn. The road passing over this structure is reasonably straight at the crossing point. No information was made

available which would identify the age of the structure; however it was probably constructed around 1955. It has a clear span of 1.8m. The Bridge Assessment Report for this structure, dated January 1991, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading), but no HB rating was calculated.

A1.3.3 Bridge No. 20033

Bridge Number 20033 is located approximately 0.5km north of the Rushvale Road and Drumadowney Road Junction. The bridge comprises a single span reinforced concrete slab culvert that carries the A8 over a tributary of the Ballymena Burn. Both the horizontal and the vertical road alignments are reasonably straight at the crossing point. No information was available about the age of the structure; however it was probably constructed around 1955. It has a clear span of 1.6m. No Bridge Assessment Report was available for this structure.

A1.3.4 Ballynure Masonry Arch (Bridge No. 20017)

This bridge is located in the centre of Ballynure. It comprises a single span masonry arch that carries the old Belfast to Larne Road over the Ballynure Water. None of the information provided specifies the geometry or the age of this bridge. The parapets would appear to comprise unreinforced masonry. No Bridge Assessment Report was available for this structure.

A1.3.5 Bridge over Ballynure Water and Pedestrian Underpass/ Castlewater Bridge (Bridge No. 20016)

This bridge was constructed in 1956 and is located in the centre of Ballynure. The reinforced concrete bridge has a clear span of 6.7m perpendicular to the abutments and carries the A8 over the Ballynure Water. Both the horizontal and the vertical road alignments are reasonably straight at the crossing point, although there are junctions with side roads immediately to the north of the bridge on both sides of the road.

Around 1980, a 1.8m wide pedestrian underpass was constructed which runs parallel to the Ballynure Water, taking pedestrians under the road bridge deck along the front of the north abutment. The pedestrian underpass is formed in reinforced concrete. The Bridge Assessment Report for this combined structure, dated June 1991, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading) and that the HB rating was 45 units.

A1.3.6 Moss Bridge / Bridge No. A8/13 (Structure No. 10526)

Moss Bridge is approximately 50 years old and is located at the A8 junction with Moss Road. The reinforced concrete bridge is a single span structure that carries the A8 over a tributary of the Larne River. The horizontal road alignment is curving at the crossing point with the vertical alignment at a reasonably straight gradient. The Bridge Assessment Report for this structure, dated March 1994, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading) and that the HB rating was in excess of 45 units.

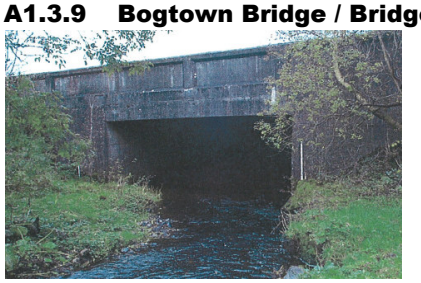
A1.3.7 Ballygowan Bridge / Bridge No. A8/12 (Structure No. 10524)

Ballygowan Bridge is located 500m north of the A8 junction with Moss Road. The reinforced concrete bridge is approximately 50 years old and is a single span simply supported structure that carries the A8 over a tributary of the Larne River. Both the horizontal and the vertical road alignments are straight at the crossing point. The Bridge Assessment Report for these structures, dated March 2002, concluded that the assessed capacity of the bridge was HA: 44 tonnes of assessment live loading; and HB rating: 45 units. The report noted that the structure was not capable of carrying the HA accidental vehicle on the skew edges of the deck and that the provision of open box beam safety barriers was essential. Safety fencing has now been installed to the structure.

A1.3.8 Stewartstown Bridge / Bridge No. A8/10 (Structure No. 10523)

Stewartstown Bridge is approximately 50 years old and is located approximately 500m southwest of the A8 junction with Park Road The bridge is a single span structure that carries the A8 over the Larne River. Both the horizontal and vertical road alignments are reasonably straight at the crossing point. The Bridge Assessment Report for this structure, dated March 1994, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading) and that the HB rating was in excess of 45 units.

A1.3.9 Bogtown Bridge / Bridge No. A8/9 (Structure No. 10522)



Bogtown Bridge is located immediately to the south of the A8 junction with Park Road. The bridge is approximately 50 years old and is very similar to Stewartstown Bridge in that it carries the A8 over the Larne River. Both the horizontal and the vertical road alignments are reasonably straight at the crossing point. The Bridge Assessment Report for this structure, dated March 1994, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading) and that the HB rating was in excess of 45 units.

A1.3.10 Lowtown Bridge / Bridge No. A8/8 (Structure No. 10521)

Lowtown Bridge is located approximately 500m from the northern end of the scheme and the B100 (Ballyrickard Road) junction. The reinforced concrete bridge is a single span structure that carries the A8 over the Glen Burn, a tributary to the Larne River. Both the horizontal and the vertical road alignments are straight at the crossing point. The Bridge Assessment Report for this structure, dated March 1994, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading) and that the HB rating was in excess of 45 units.

A1.3.11 Gingles Corner Bridge / Bridge No. A8/7 (Structure No. 10520) - Ballyedward Cattle Creep (Structure No. 11562).

Gingles Corner Bridge and Ballyedward Cattle Creep were built around 1966 and are located at the commencement of the dual carriageway at the northern end of the scheme (just beyond the study limits). The structure acts as both a bridge over a stream and a bridge (or cattle creep) allowing cattle to cross under the A8 dual carriageway. The Bridge Assessment Report for these structures, dated March 1994, concluded that the bridge satisfied the requirements of the full assessment load (40 tonnes Assessment Live loading) and that the HB rating was in excess of 45 units.

A1.4 Highway Drainage

No original as-built drainage information for the A8 was made available for this assessment. The only drainage records obtained included the two new crawler lanes either side of Ballynure and the roundabouts recently constructed at Coleman's Corner and at the junction with the A57 (Templepatrick Road). These show a kerb and gully drainage system for the widened side of the carriageway connected to a piped drainage system.

By visual inspection it has been established that the majority of the existing road is also drained by a kerb and gully drainage system. However, no manholes were observed and therefore it is assumed that gullies either drain into soakaways or out through the embankment slopes.

The A8 passes over 15 separate watercourses. The Ballynure Water and Larne River are the main watercourses crossed by the existing A8. Ballynure Water is spanned by structure numbers 20016 and 20017 (see section A1.3.5 and A1.3.6) in the centre of Ballynure and the Larne River (before it forms the Inver River) is spanned by structure number 10523, Stewartstown Bridge and structure number 10522, Bogtown Bridge (see section A1.3.9 and A1.3.10). The remainder of the watercourses are carried by a variety of culverts and structures.

Drawing numbers A8-HWY-001 and 002 (Appendix A) illustrate the locations and status of the watercourses within the study area.

A1.5 Utility Services

The existing utility services within the study area were established via a search of the internet based Mosaic database which contains digital information on apparatus for several utility companies. This was then supplemented by information supplied directly from the identified utility service providers, listed as follows:

- Northern Ireland Electricity (NIE),
- Northern Ireland Water,
- British Telecom (BT),
- Bord Gais Eireann (Bord Gais Networks, licensed to build a high-pressure gas transmission network), and
- Phoenix Natural Gas (owner and operator of gas distribution network).

A1.5.1 Northern Ireland Electricity

Northern Ireland Electricity has a large amount of apparatus and plant in the study area. The main aspects of the equipment are two 275KV and two 110KV overhead cable runs that cross the route to the north of Ballynure. In addition there is a single 33KV overhead cable run that crosses the A8 200m north of Rushvale Road.

A1.5.2 Northern Ireland Water

Northern Ireland Water has a 15" watermain that crosses the scheme 750m south of the Ballybraken Road Junction. There are also a number of other watermains and sewers present throughout the study area along the A8 and other local roads.

A1.5.3 British Telecom (BT)

BT has a major cable route running along the eastern verge of the A8. The cable route is understood to be optical fibre cables and they run the length of the scheme from the Coleman's Corner junction to the Ballyrickard Road junction.

A1.5.4 Bord Gais Eireann

Bord Gais Eireann has a 450mm diameter gas main which crosses the scheme 150m south of the Ballybraken Road junction.

A1.5.5 Phoenix Natural Gas

Phoenix Natural Gas does not have any apparatus with the study area.

A1.6 Traffic Regulations Orders (TROs)

The A8 within the study area is generally derestricted and therefore, for the majority of its length, is subject to the national speed limit of 60mph. However, a 40mph speed limit applies through Ballynure between a point some 50m south of the A57 (Templepatrick Road) junction, to a point approximately 260m north of the Lismenary Road Junction.

The whole section of the A8 route is subject to a 24 hour clearway prohibiting stopping on the main carriageway. There is also a short section of waiting restrictions before the Main Street junction in Ballynure where double yellow lines are present.

A1.7 Carriageway Lighting

There are two short sections of road lighting and they are both limited to two settlements on the road. The first section is approximately 670m in length and covers the small settlement of Bruslee at the southern end of the scheme. The second section approximately coincides with the 40mph speed restriction through the village of Ballynure.

A1.8 Pavement Condition

Deflectograph and S.C.R.I.M (Sideway-force Coefficient Routine Investigation Machine) data has been provided for the assessment of pavement for the existing A8. The deflectograph information suggests the existing pavement construction is generally in a good condition, but there are two sections (as outlined below) where the pavement condition shows some deterioration. The S.C.R.I.M data also showed that over the same sections the skid resistance of the A8 was not as high as would have been expected

- between the A57 roundabout, through Ballynure, to the southern junction with the Ballygowan Road. However, this section of road was resurfaced in July and August 2008; and
- from the Park Road junction to end of the existing dual carriageway at the Ballyrickard Road Junction.

A1.9 Geology and Soils

An investigation of the geology and soils was undertaken and the results published in the report, *GN 165: A8 Dualling Belfast to Larne - Preliminary Sources Study Report*, May 2008. A summary of the study findings is presented on geotechnical features plans, drawing numbers A8-GEO-001 and 002, which are provided in Appendix A.

The alignment of the existing A8 between the Coleman's Corner roundabout and Ballynure crosses gently undulating terrain underlain by glacial till, which is thin and discontinuous in places. The existing road between Drumadowney Road and Green Road crosses some

glaciolacustrine deposits (potentially weaker than surrounding glacial till material) and areas of poorly drained ground that may be associated with an old glacial channel.

The A8 then drops into the Six Mile Water valley just before Ballynure, and it crosses the Ballynure Water in the village. The road then traverses up the valley on ground that is predominantly glacial till. To the north of Ballynure the A8 passes to the west of Spennin Hill, which comprises of basalt rock, before crossing an area of poorly drained ground as the road crosses into the Larne / Inver River valley.

From Ballygowan Road (south), the A8 follows the western edge of the valley bottom, passing to the east of Craiginorne Hill passing between two drumlins in the vicinity of Deerpark Road. It then crosses the Larne River immediately before Park Road, before crossing some further areas of poorly drained ground in the valley bottom. The A8 then climbs slightly to the junction with the B100 Ballyrickard Road.

Throughout the study area it has been established that the glacial till material near the surface is often soft with low California Bearing Ratio (CBR) values. In addition, there are spreads of alluvium in the valley bottoms and small areas of peat surrounding the current alignment. The groundwater in the area is generally high with many springs and rises documented across the landscape; consequently the alluvial valley bottoms are typically wet and poorly drained.

A2 Drawings

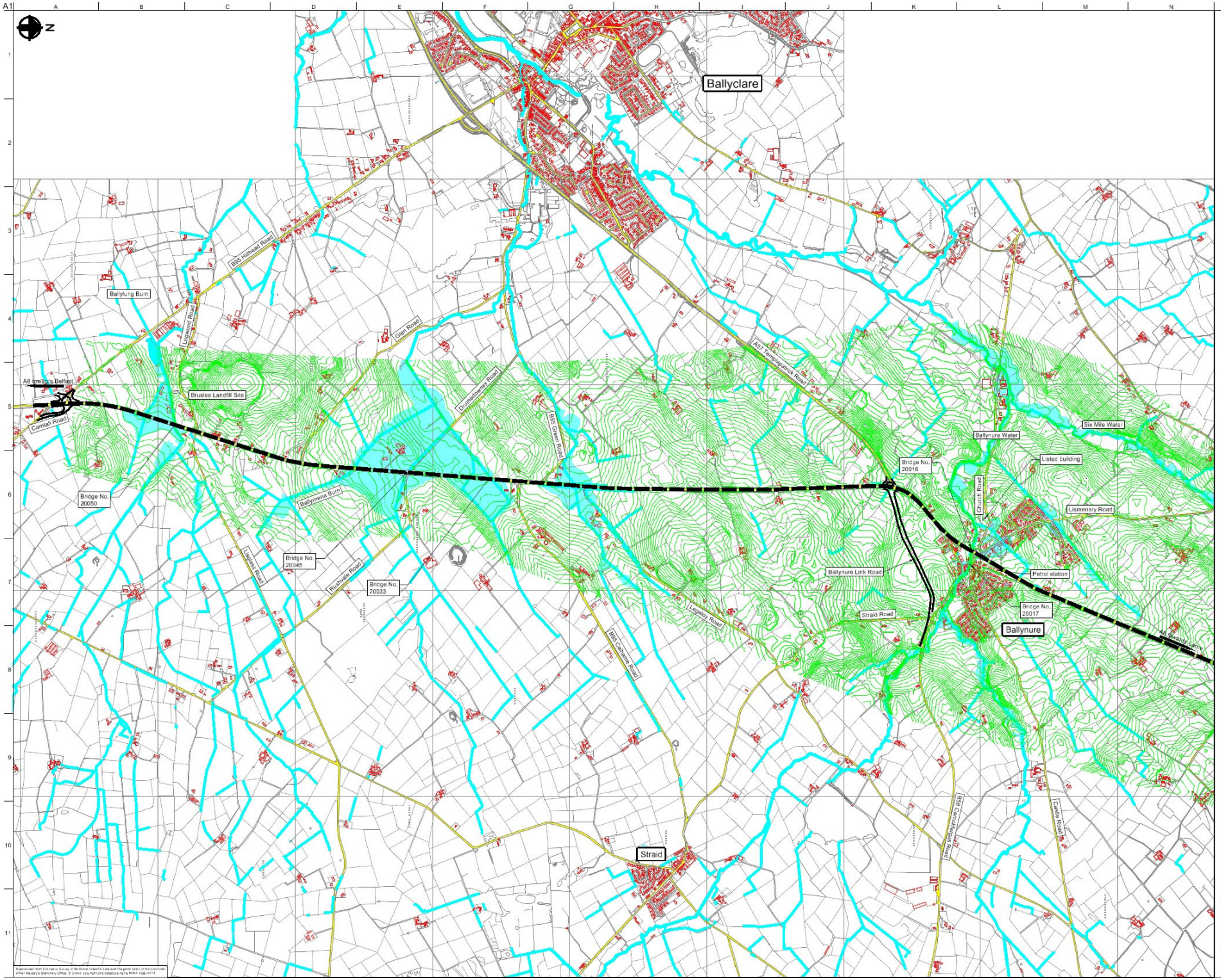
A8-HWY-001 – Existing Features, Sheet 1 of 2

A8-HWY-002 – Existing Features, Sheet 2 of 2

A8-HWY-006 – Existing Utilities Plan

A8-GE0-001 – Geotechnical Features Plan, Sheet 1 of 2

A8-GEO-002 – Geotechnical Features Plan, Sheet 1 of 2



Issue	Date	By	Chkd	Appd
P0	05/08/08	GW	CF	SH

Stage 1 Assessment

ARUP

The Arup Campus, Blythe Gate, Blythe Valley Park
Solihull, West Midlands B90 8AE
T +44(0)121 213 3000 F +44(0)121 213 3001
www.arup.com

Client
Roads Service

Job Title
A8 Dualling
Belfast to Larne

Drawing Title
Existing Features

Sheet 1 of 2

Scale at A1 1:10000

Plot ID

Drawing Status
Final

Job No	Drawing No	Issue
124785-00	A8-HWY-001	P0

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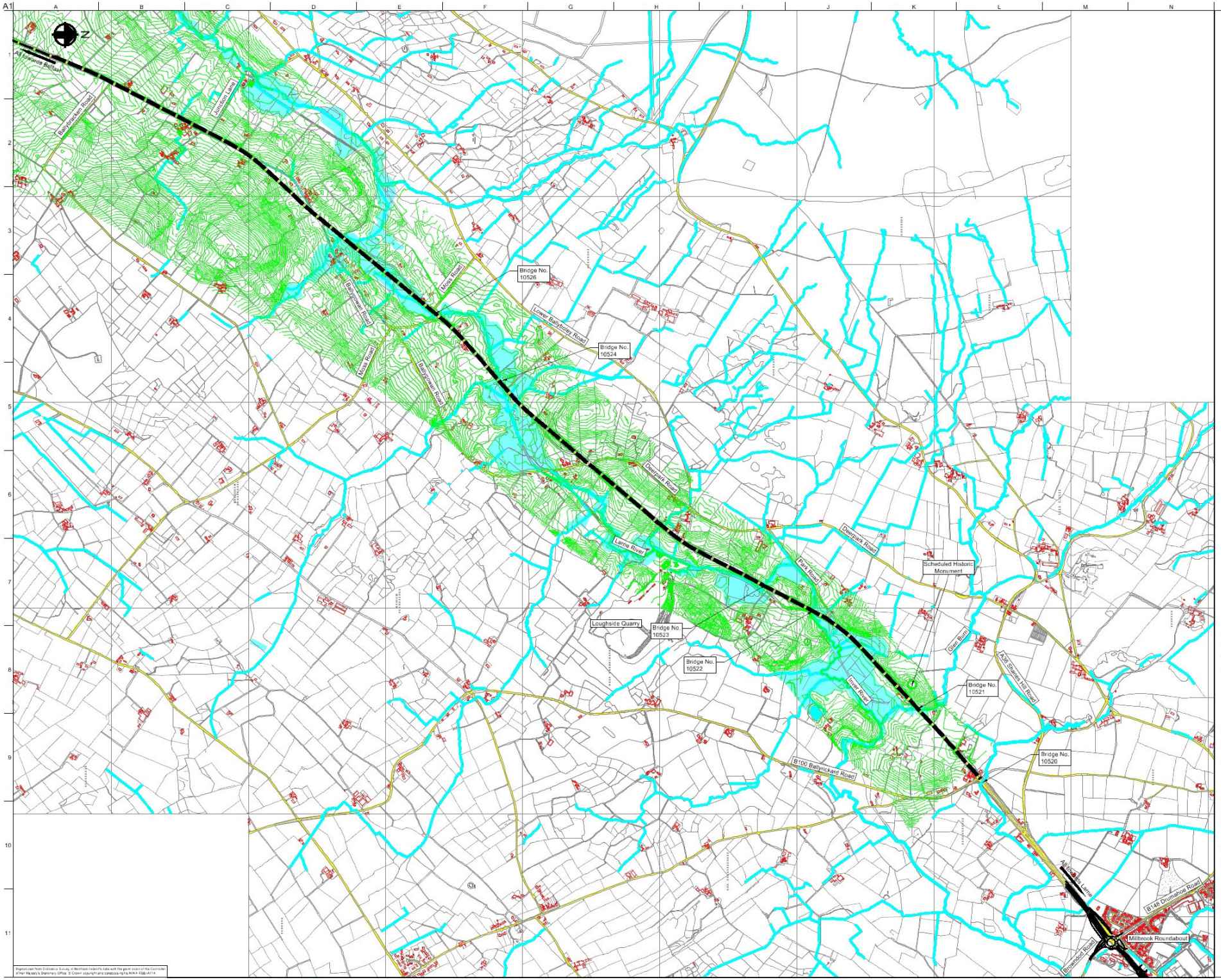
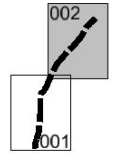


Key:

- Existing A8 single carriageway
- Roads
- Water courses
- Buildings
- 1:100 Year flood level mapping
- Contours

Notes:

1. Bridge numbers area as supplied by Roads Service



Issue	Date	By	Chkd	Appd
P0	05/08/08	GW	CF	SH

Stage 1 Assessment Report

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The Arup Campus, Blythe Gate, Blythe Valley Park
Solihull, West Midlands B90 8AE
T +44(0)121 213 3000 F +44(0)121 213 3001
www.arup.com

Client: Roads Service

Job Title: A8 Dualling Belfast to Larne

Drawing Title: Existing Features

Sheet 2 of 2

Scale at A1: 1:10000

Plot ID:

Drawing Status: **Final**

Job No	Drawing No	Issue
124785-00	A8-HWY-002	P0

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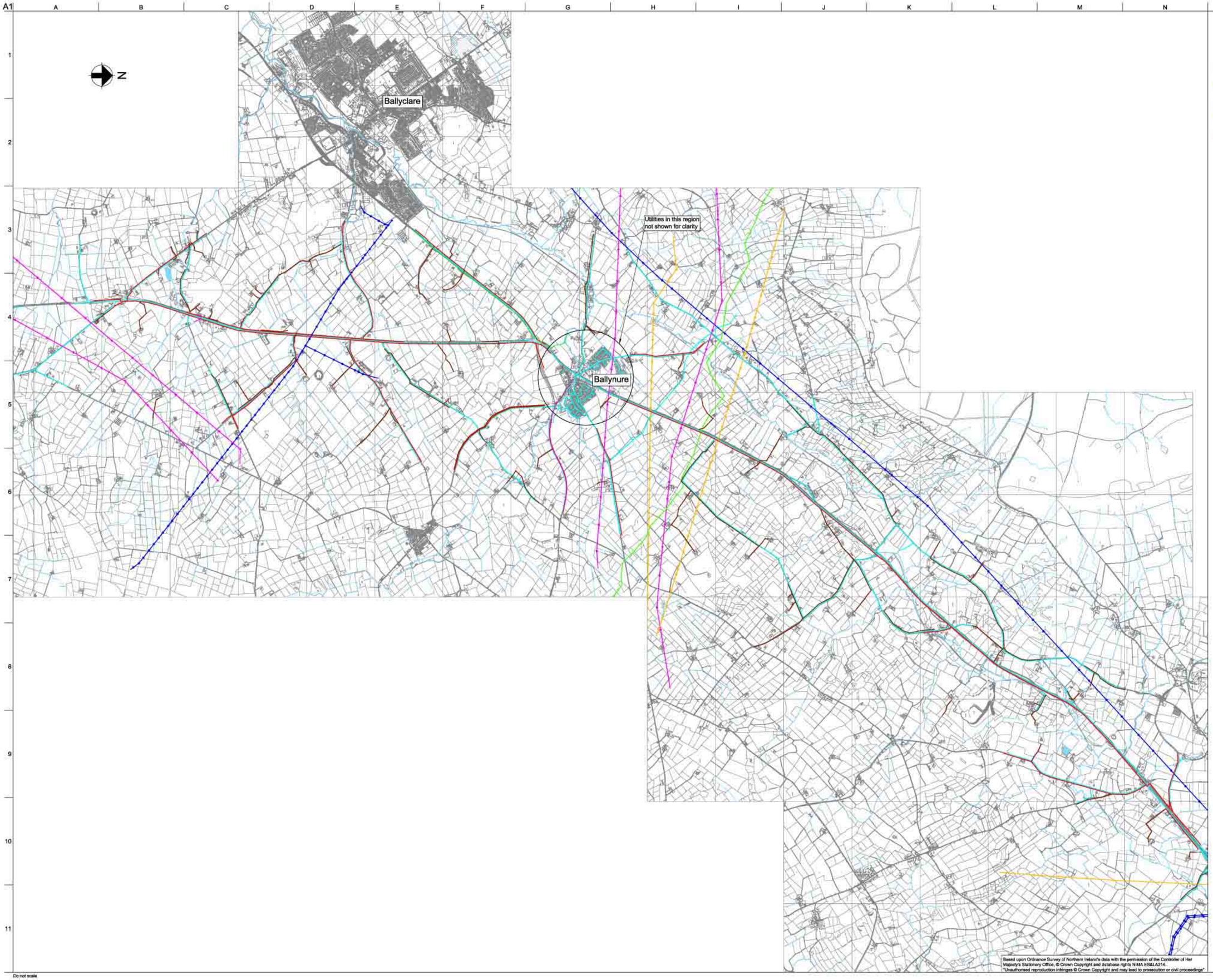

Key

- 450 Ø Gas main
- Overhead BT Cable
- Underground BT Cable
- 275KV Overhead with pylons
- 110KV Overhead with poles/pylons
- 33KV Overhead with poles
- Watermains and future works

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Issue	Date	By	Chkd	Appd
P2	29/07/09	IA	CF	SH
	Final			
P1	01/05/09	IA	CF	SH
	1st Draft			

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The Limenhall, 8th Floor, 32-38 Linenhall Street
Belfast BT2 8BG
Tel 44(0)28 90890900 Fax +44(0)28 90890901
www.arup.com

Client

ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Existing Utilities Plan

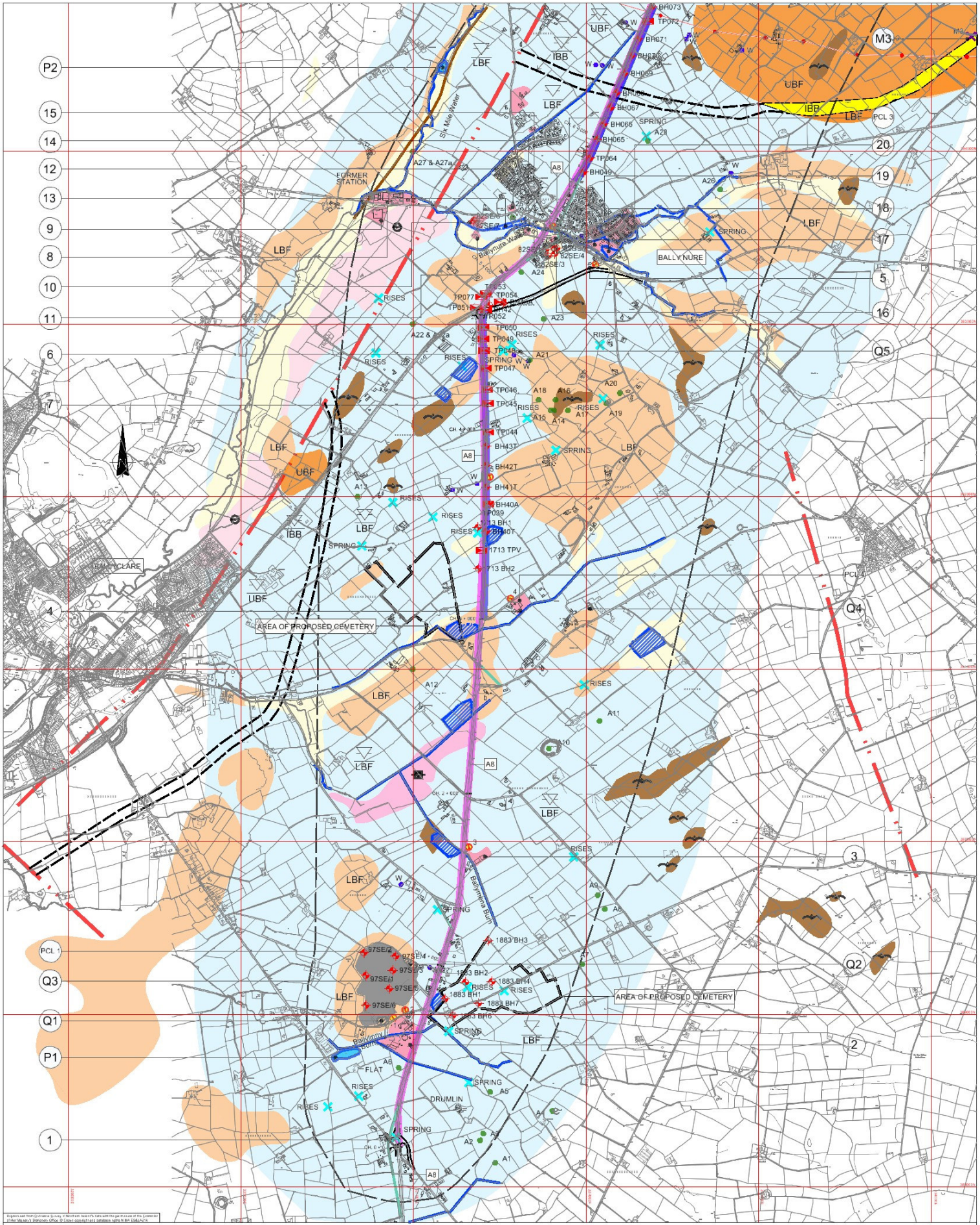
Scale at A1 1:20000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8-HWY-006	P2



Key

- Lower basalt formation (LBF)
- Upper basalt formation (UBF)
- Inter basalt bed (IBB)
- Alluvium
- Fluvioglacial deposits
- Glaciolacustrine deposits
- Peat
- Drumlins
- Glacial till
- Springs
- Archaeological Feature
- Location of photo (with number ref. Appendix B)
- Mine
- Borehole
- Trial Pit
- Poorly drained area
- Buildings
- Quarry
- Well
- Water Course
- Fault
- Former mill streams
- Existing A8
- Original line of A8
- New crawler lane
- Extent of preliminary sources study corridor
- Geological boundary (beneath drift deposits)
- Overhead power lines

Issue	Date	By	Chkd	Appd
P0	05/08/08	GW	CF	SAH
Stage 1 Assessment Report				

Client: Roads Service

Job Title: A8 Dualling Belfast to Larne

Drawing Title: Geotechnical Features Plan

Sheet 1 of 2

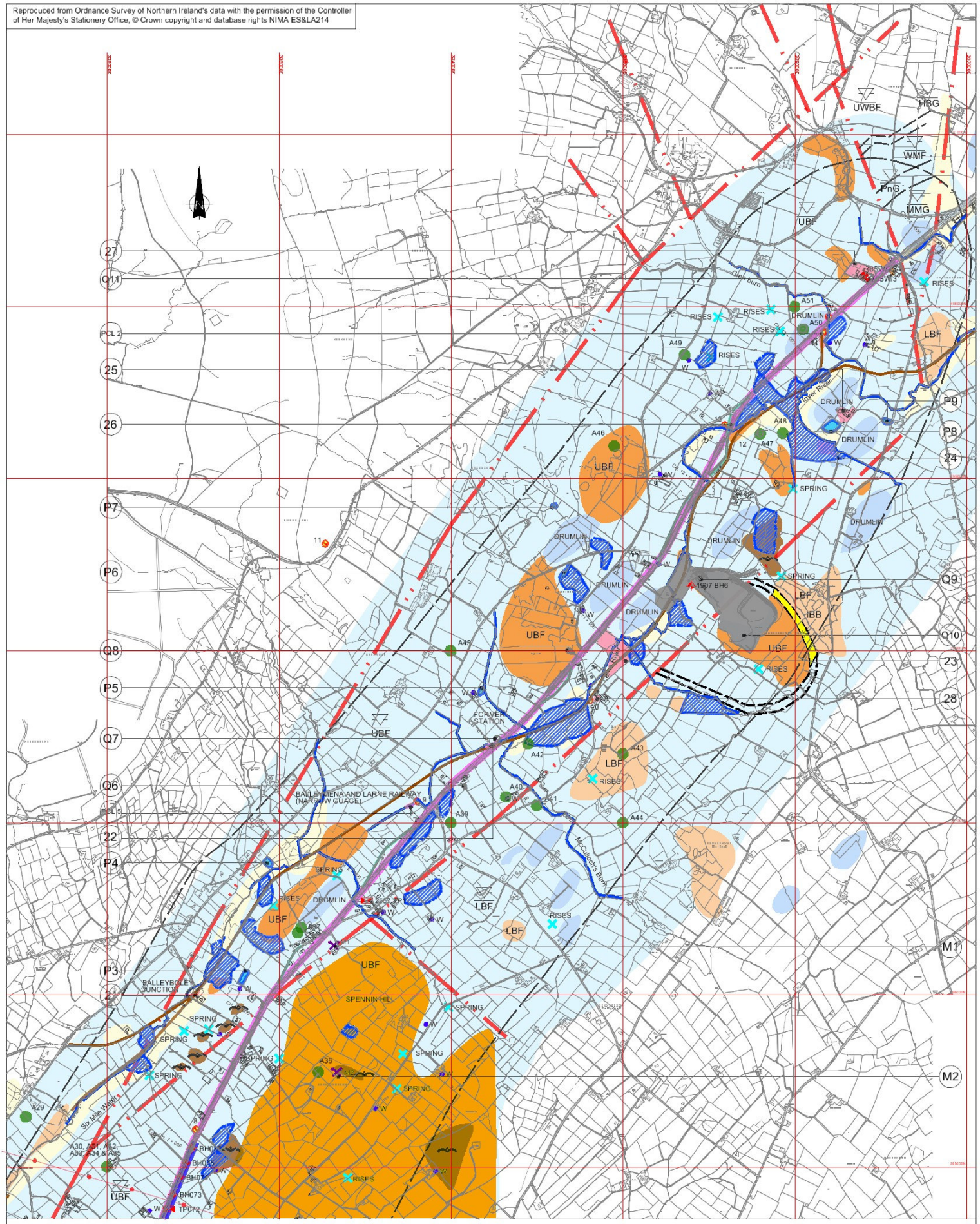
ARUP

Scale at A1: 1:10000

Plot ID:

Drawing Status: Final

Job No	Drawing No	Issue
124785-00	A8-GEO-001	P0



Key:

- Lower basalt formation (LBF)
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- Existing A8
- Original line of A8
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- Geological boundary (beneath drift deposits)
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Issue	Date	By	Chkd	Appd
P0	05/08/08	GW	CF	SH
Stage 1 Assessment Report				

Client: Roads Service

Job Title: A8 Dualling Belfast to Larne

Drawing Title: Geotechnical Features Plan

Sheet 2 of 2

ARUP

Scale at A1: 1:10000

Plot ID:

Drawing Status: Final

Job No	Drawing No	Issue
124785-00	A8-GEO-002	P0

Appendix B

Stage 1 Recommended Corridor and Stage 2 Route Option Drawings

B1 Drawings

A8-HWY-007 - Stage 1 Recommended Corridors

A8-HWY-008 - Stage 1 Recommended Corridors, Sub-Corridors and Stage 2 Routes

A8-S2-HWY-001 - Stage 2 Route A1

A8-S2-HWY-002 - Stage 2 Route A2

A8-S2-HWY-003 - Stage 2 Route A3

A8-S2-HWY-004 - Stage 2 Route B1

A8-S2-HWY-005 - Stage 2 Route B2

A8-S2-HWY-006 - Stage 2 Route B3

A8-S2-HWY-007 - Stage 2 Route B4

A8-S2-HWY-008 - Stage 2 Route B5

A8-S2-HWY-009 - Stage 2 Route B6

A8-S2-HWY-010 - Stage 2 Route C1

Issue	Date	By	Chkd	Appd
P2	29/07/09	IA	CF	SH
	Final			
P1	07/04/09	IA	CF	SH
	1st Draft			

ARUP

The Linenhall, 8th Floor, 32-38 Linenhall Street
Belfast BT2 8BG
Tel +44(0)28 90569900 Fax +44(0)28 90569901
www.arup.com

Client: ROADS Service

Job Title
A8 Dualling
Belfast to Larne

Drawing Title
Stage 1 Recommended Corridors

Scale at A1: 1:20000

Discipline:

Drawing Status
Final

Job No	Drawing No	Issue
124785-00	A8-HWY-007	P2

Do not scale

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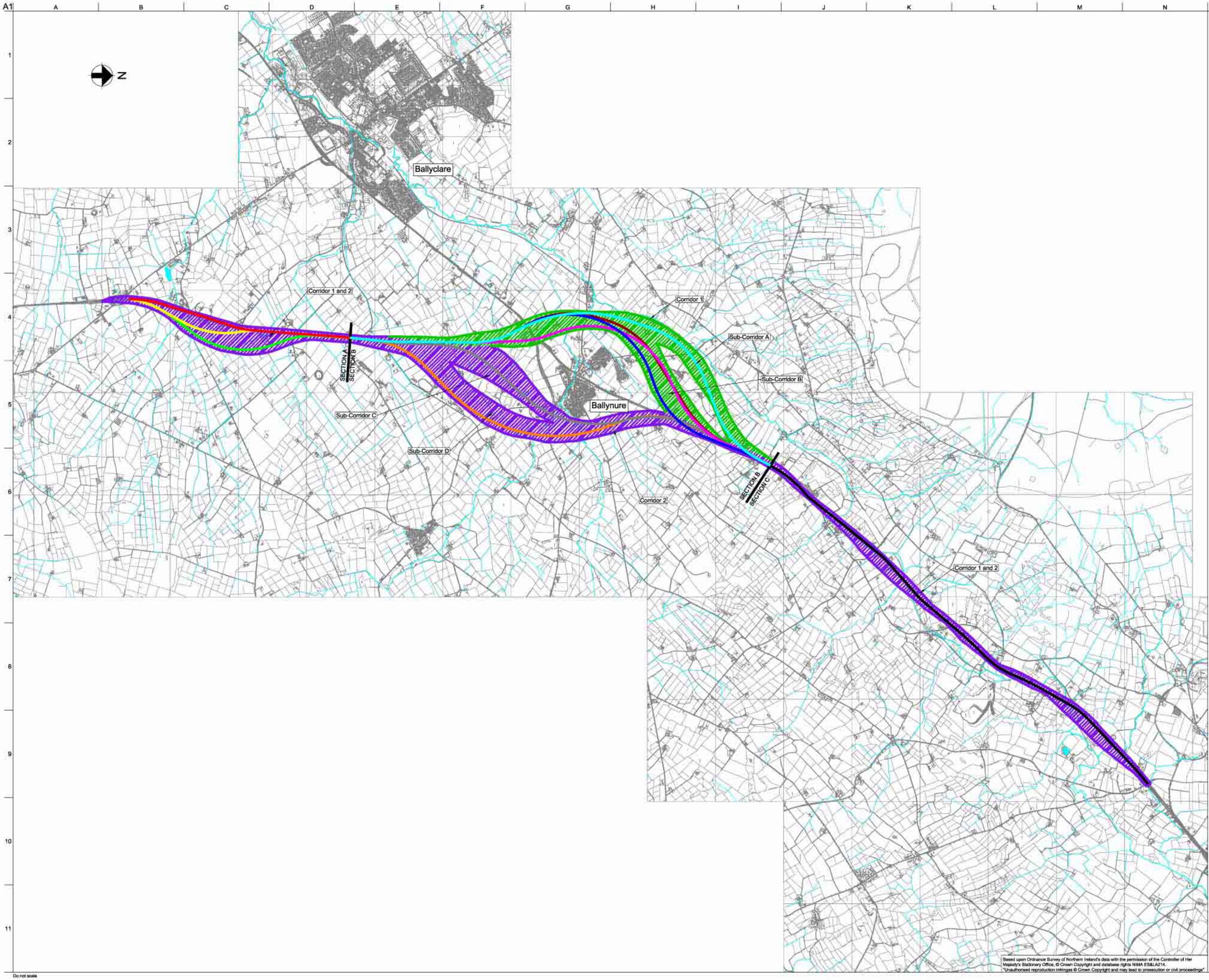

Key

- Route A1
- Route A2
- Route A3
- Route B1
- Route B2
- Route B3
- Route B4
- Route B5
- Route B6
- Route C1

Issue	Date	By	Chkd	Appd
P2	29/07/09	IA	CF	SH
	Final			
P1	01/05/09	IA	CF	SH
	1st Draft			

ARUP

The Limenhall, 8th Floor, 32-38 Linenhall Street
Belfast BT2 8BG
Tel 44(0)28 90890900 Fax +44(0)28 90890901
www.arup.com

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ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Preferred Corridors, Sub-Corridors, and Stage 2 Route Options

Scale at A1 1:20000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8-HWY-008	P2

A1

N

Ballyclare

Ballynure

Straid

Key

- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

B95 Hillhead Road
Logwood Road
Improved junction between Logwood Road and Hillhead Road
Glen Road
Left-in Left-out access to the new A8
A8 towards Belfast
Embankment
Cutting
Camtall Road
Ballyfenny Burn
Ballymena Burn
Drumadowney Road
B95 Green Road
A57 Templepatrick Road
Ballynure Water
Church Road
SECTION A
SECTION B
For continuation see drawings:-
Option B1 - A8-S2-HWY-004
Option B2 - A8-S2-HWY-005
Option B3 - A8-S2-HWY-006
Option B4 - A8-S2-HWY-007
Option B5 - A8-S2-HWY-008
Option B6 - A8-S2-HWY-009
Left-in Left-out access to the new A8
Lieglass Road
Rushvale Road
Left-in Left-out access to the new A8
Ballynure Link Road
Legaloy Road
Straid Road
B95 Calhame Road
Green Burn
Bryanburg Water
B56 Carnlea Road

P4	29/07/09	IA	CF	SH
	Final			
P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			
Issue	Date	By	Chkd	Appd

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The Linenhall, 8th Floor, 32-38 Linenhall Street
Belfast BT2 8BG
Tel +44(0)28 90890900 Fax +44(0)28 90890901
www.arup.com

Client

ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Section A - Bruslee Section
Route A1

Scale at A1 1:10000

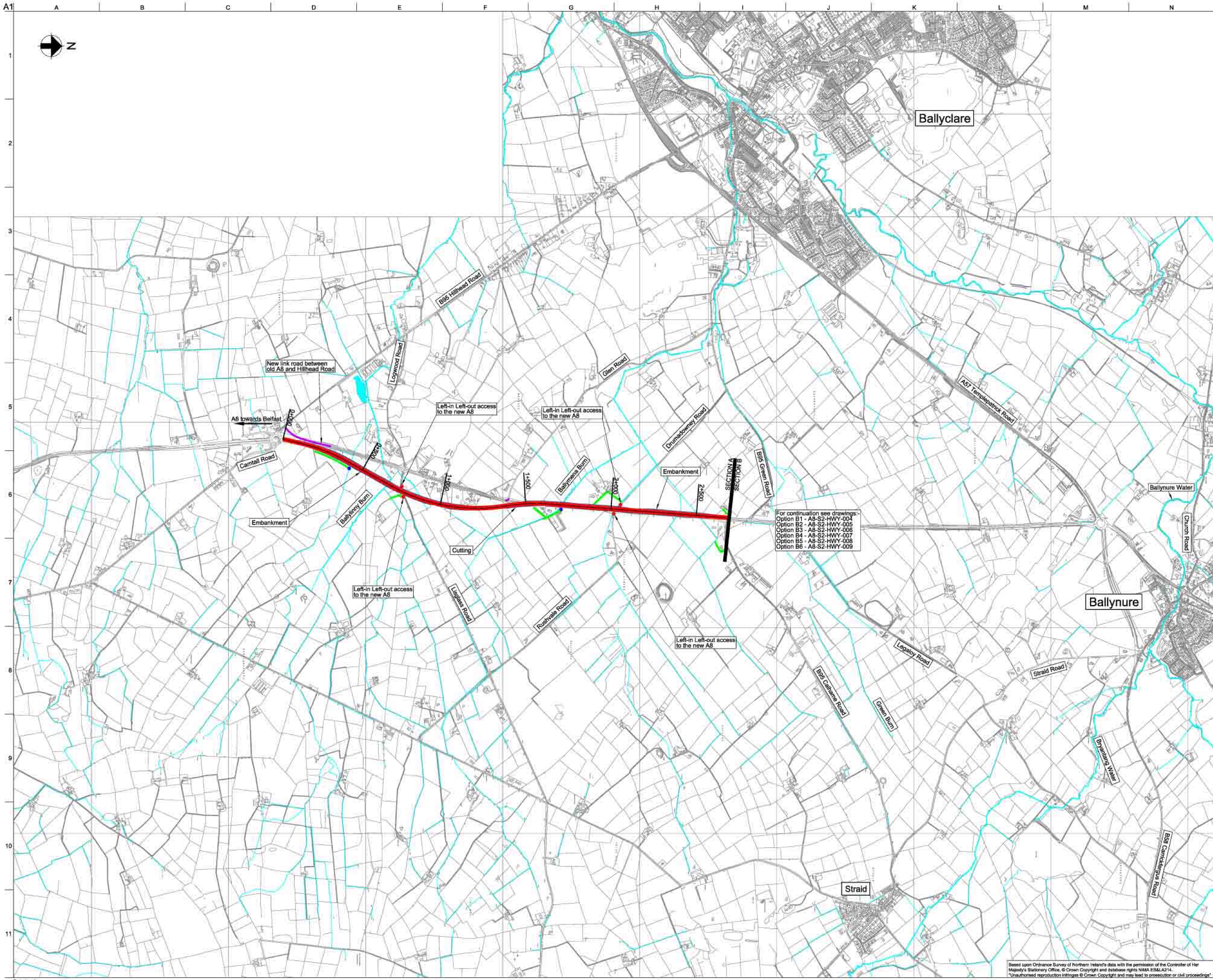
Discipline

Drawing Status

Final

Job No	Drawing No:	Issue
124785-00	**A8_S2_HWY_001**	**P4**

J:\124000\124785-00\4 Internal Project Data\4-30 Drawings\4-33 Civil/CH_Highways\Temp Microstation Files\A8_S2_HWY_001.dgn



Do not scale

Key

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- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

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Issue	Date	By	Chkd	Appd
P4	29/07/09	IA	CF	SH
	Final			
P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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ROADS Service

Job Title
A8 Dualling
Belfast to Larne

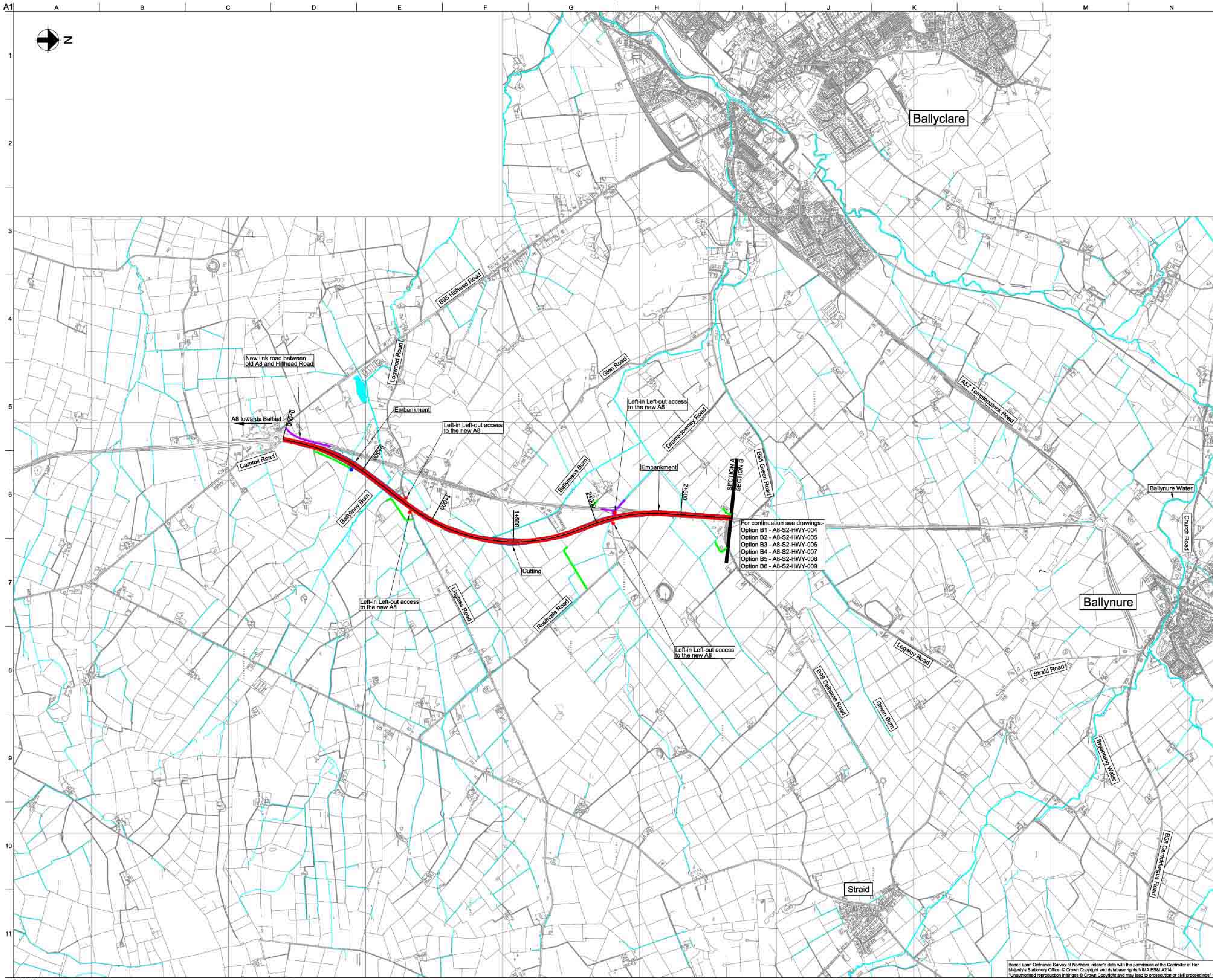
Drawing Title
Section A - Bruslee Section
Route A2

Scale at A1 1:10000

Discipline

Drawing Status
Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_002	P4



Key

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- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

Issue	Date	By	Chkd	Appd
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P1	19/02/09	BF	CF	SH
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ROADS Service

Job Title
A8 Dualling
Belfast to Larne

Drawing Title
Section A - Bruslee Section
Route A3

Scale at A1 1:10000

Discipline

Drawing Status
Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_003	P4

J:\124000\124785-004 Internal Project Data\4-30 Drawings\4-33 Civil\CH_Highways\Temp Microstation Files\A8_S2_HWY_003.dgn

A1

Ballyclare

Indicative full grade seperated junction at A57 Templepatrick Road and B58 Carrickfergus Road (side road passing over new route with slip road on and off). Final layout and location subject to more detailed assessment.

Church Road maintained passing beneath the new route. No access provided from Church Road onto or off the new route.

Indicative realignment of Lismenary Road to include a bridge over the new route. No access provided from Lismenary Road onto or off the new route

Embankment

Six Mile Water

Ballynure Water

Church Road

Cutting

Junction Lane

A57 Templepatrick Road

Drumadowney Road

B95 Green Road

Ballynure Link Road

Old A8 retained for local access. No connection between old and new route.

For continuation see drawings:-
Option A1 - A8-S2-HWY-001
Option A2 - A8-S2-HWY-002
Option A3 - A8-S2-HWY-003

For continuation see drawing:-
Option C1 - A8-S2-HWY-010

SECTION A
SECTION B
SECTION B
SECTION C

Indicative compact grade seperated junction at Ballybraken Road with connection to old A8 (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Ballybracken Road

Straid Road

Legaloy Road

Castle Water

Bryantang Water

Rushvale Road

B95 Calhame Road

Green Burn

Indicative compact grade seperated junction at B95 Calhame Road, Green Road and Legaloy Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

B58 Carrickfergus Road

Castle Road

Straid

Key

- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

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	Final			
P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Section B - Ballynure Section
Route B1

Scale at A1 1:10000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_004	P4

J:\124000\124785-004 Internal Project Data\4-30 Drawings\4-33 Civil/CH_Highways\Temp Microstation Files\A8_S2_HWY_004.dgn

A1

Ballyclare

Indicative full grade seperated junction at A57 Templepatrick Road and B58 Carrickfergus Road (side road passing over new route with slip road on and off). Final layout and location subject to more detailed assessment.

Church Road maintained passing beneath the new route. No access provided from Church Road onto or off the new route.

Indicative realignment of Lismenary Road to include a bridge over the new route. No access provided from Lismenary Road onto or off the new route

indicative compact grade seperated junction at B95 Calhame Road, Green Road and Legaloy Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

A57 Templepatrick Road

Embankment

2+500

2+000

Ballynure Water

Church Road

3+000

Six Mile Water

Cutting

1+957

Lismenary Road

4+000

Embankment

4+500

5+000

5+500

Junction Lane

For continuation see drawing:- Option C1 - A8-S2-HWY-010

Cutting

Ballybracken Road

Cutting

SECTION B

SECTION C

Indicative compact grade seperated junction at Ballybraken Road with connection to old A8 (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Drumadowney Road

B95 Green Road

0+000

0+500

1+000

1+500

Embankment

Embankment

Cutting

Ballynure Link Road

Straid Road

Legaloy Road

B95 Calhame Road

Green Burn

Rushville Road

Bryanlang Water

Castle Water

Castle Road

B58 Carrickfergus Road

Straid

For continuation see drawings:- Option A1 - A8-S2-HWY-001 Option A2 - A8-S2-HWY-002 Option A3 - A8-S2-HWY-003

SECTION A

SECTION B

"Old A8 retained for local access. No connection between old and new route.

Key

- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

Issue	Date	By	Chkd	Appd
P4	29/07/09	IA	CF	SH
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P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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Client

ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Section B - Ballynure Section
Route B2

Scale at A1 1:10000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_005	P4

J:\124000\124785-00\4 Internal Project Data\4-30 Drawings\4-33 Civil\CH_Highways\Temp Microstation Files\A8_S2_HWY_005.dgn

A1

Ballyclare

Indicative full grade seperated junction at A57 Templepatrick Road and B58 Carrickfergus Road (side road passing over new route with slip road on and off). Final layout and location subject to more detailed assessment.

Church Road maintained passing beneath the new route. No access provided from Church Road onto or off the new route.

Indicative realignment of Lismenary Road to include a bridge over the new route. No access provided from Lismenary Road onto or off the new route

Six Mile Water

A57 Templepatrick Road

Embankment

Ballynure Water

Cutting

Church Road

Lismenary Road

Drumadowney Road

B95 Green Road

Ballynure Link Road

Junction Lane

For continuation see drawings:-
Option A1 - A8-S2-HWY-001
Option A2 - A8-S2-HWY-002
Option A3 - A8-S2-HWY-003

For continuation see drawing:-
Option C1 - A8-S2-HWY-010.

Indicative compact grade seperated junction at Ballybraken Road with connection to old A8 (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Ballybracken Road

SECTION A

SECTION B

SECTION C

Straid Road

Legaloy Road

Castle Water

Bryantang Water

B95 Calhame Road

Green Burn

B58 Carrickfergus Road

Castle Road

Indicative compact grade seperated junction at B95 Calhame Road, Green Road and Legaloy Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Straid

Key

- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

Issue	Date	By	Chkd	Appd
P4	29/07/09	IA	CF	SH
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P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Section B - Ballynure Section
Route B3

Scale at A1 1:10000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_006	P4

J:\124000\124785-00\4 Internal Project Data\4-30 Drawings\4-33 Civil\CH_Highways\Temp Microstation Files\A8_S2_HWY_006.dgn

A1

Ballyclare

Indicative compact grade seperated junction at B95 Calhame Road, Green Road and Legaloy Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

For continuation see drawings:-
Option A1 - A8-S2-HWY-001
Option A2 - A8-S2-HWY-002
Option A3 - A8-S2-HWY-003

Castle Road maintained passing beneath the new route. No access provided from Church Road onto or off the new route.

Indicative compact grade seperated junction at Ballybracken Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

For continuation see drawing:-
Option C1 - A8-S2-HWY-010.

Indicative full grade seperated junction at B58 Carrickfergus Road (side road passing over new route with slip road on and off). Final layout and location subject to more detailed assessment.

Straid

A57 Templepatrick Road
Six Mile Water
Ballynure Water
Church Road
Lisnerany Road
Glen Road
Drumadowney Road
B95 Green Road
Embankment
Cutting
Ballynure Link Road
Junction Lane
Ballybracken Road
Ballyhenry Burn
SECTION A
SECTION B
SECTION C
Straid Road
Legaloy Road
Rushvale Road
B95 Calhame Road
Green Burn
Bryansland Water
Castle Water
Castle Road
B58 Carrickfergus Road

Key
- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

Issue	Date	By	Chkd	Appd
P4	29/07/09	IA	CF	SH
	Final			
P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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Client: ROADS Service

Job Title: A8 Dualling
Belfast to Larne

Drawing Title: Section B - Ballynure Section
Route B4

Scale at A1: 1:10000

Discipline:

Drawing Status: Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_007	P4

J:\124000\124785-00\4 Internal Project Data\4-30 Drawings\4-33 Civil\CH_Highways\Temp Microstation Files\A8_S2_HWY_007.dgn

Ballyclare

Straid

A57 Templepatrick Road

Six Mile Water

Ballynure Water

Church Road

Lisnenary Road

Glen Road

Drumadowney Road

B95 Green Road

Ballynure Link Road

Ballyhenry Burn

Junction Lane

Ballybracken Road

Straid Road

Legaloy Road

Castle Water

Bryansland Water

Cutting

Embankment

Green Burn

B95 Calhame Road

Rushvale Road

B58 Carrickfergus Road

Castle Road

SECTION A

SECTION B

SECTION C

Indicative compact grade seperated junction at B95 Calhame Road, Green Road and Legaloy Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

For continuation see drawings:-
Option A1 - A8-S2-HWY-001
Option A2 - A8-S2-HWY-002
Option A3 - A8-S2-HWY-003

Indicative full grade seperated junction at A57 Templepatrick Road and B58 Carrickfergus Road (side road passing over new route with slip road on and off). Final layout and location subject to more detailed assessment.

Castle Road maintained passing beneath the new route. No access provided from Church Road onto or off the new route.

Indicative compact grade seperated junction at Ballybracken Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

For continuation see drawing:-
Option C1 - A8-S2-HWY-010.

Key

- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

Issue	Date	By	Chkd	Appd
P4	29/07/09	IA	CF	SH
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P3	01/05/09	IA	CF	SH
	3rd Draft			
P2	03/03/09	BF	CF	SH
	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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Client

ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Section B - Ballynure Section
Route B5

Scale at A1 1:10000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_008	P4

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A1

Ballyclare

Straid

Indicative full grade seperated junction at A57 Templepatrick Road and B58 Carrickfergus Road (side road passing over new route with slip road on and off). Final layout and location subject to more detailed assessment.

Church Road maintained passing beneath the new route. No access provided from Church Road onto or off the new route.

Indicative realignment of Lismenary Road to include a bridge over the new route. No access provided from Lismenary Road onto or off the new route

Indicative compact grade seperated junction at Ballybraken Road with connection to old A8 (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Indicative compact grade seperated junction at B95 Calhame Road, Green Road and Legaloy Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Old A8 retained for local access. No connection between old and new route.

For continuation see drawings:-
Option A1 - A8-S2-HWY-001
Option A2 - A8-S2-HWY-002
Option A3 - A8-S2-HWY-003

For continuation see drawing:-
Option C1 - A8-S2-HWY-010

A57 Templepatrick Road
Drumadowney Road
B95 Green Road
B95 Calhame Road
Legaloy Road
Straid Road
Green Burn
Ballynure Water
Ballynure Link Road
Church Road
Six Mile Water
Bryantang Water
Castle Water
Castle Road
B58 Carrickfergus Road
Lismenary Road
Ballybraken Road
Junction Lane
Embankment
Cutting
SECTION A
SECTION B
SECTION C

Key
- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

Issue	Date	By	Chkd	Appd
P4	29/07/09	IA	CF	SH
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P2	03/03/09	BF	CF	SH
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Client: ROADS Service

Job Title: A8 Dualling
Belfast to Larne

Drawing Title: Section B - Ballynure Section
Route B6

Scale at A1: 1:10000

Discipline:

Drawing Status: Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_009	P4

J:\124000\124785-00\4 Internal Project Data\4-30 Drawings\4-33 Civil/CH_Highways\Temp Microstation Files\A8_S2_HWY_009.dgn

A1

N

For continuation see drawings:-
Option B1 - A8-S2-HWY-004
Option B2 - A8-S2-HWY-005
Option B3 - A8-S2-HWY-006
Option B4 - A8-S2-HWY-007
Option B5 - A8-S2-HWY-008
Option B6 - A8-S2-HWY-009

SECTION B
SECTION C

Junction Lane

Embankment

Cutting

Moss Road

Lower Ballyboley Road

Indicative compact grade separated junction at Moss Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Embankment

Cutting

Ballygowan Road

No access from Ballygowan Road to the new A8

Moss Road

Ballygowan Road

No access from Deerpark Road to the new A8

Cutting

Embankment

Deerpark Road

Larne River

No access from Ballygowan Road to the new A8

Embankment

Indicative compact grade seperated junction between Deerpark Road and Park Road (side road passing over new route with slip roads on and off). Final layout and location of bridge subject to more detailed assessment.

Deerpark Road

No access from Park Road to the new A8

Park Road

Cutting

Glen Burn

A36 Shanes Hill Road

Embankment

Cutting

Inver River

Embankment

B100 Ballyrickard Road

Indicative roundabout at B100 Ballyrickard Road and A36 Shanes Hill Road. Final layout and location subject to more detailed assessment

Key

- Indicative Side Road left-in / left-out access to new A8
- Indicative private left-in / left-out access to the new A8
- Indicative alternative access from adjacent junction or side road
- New Side road (Major Earthworks illustrated)
- New A8 Dualling (Major Earthworks illustrated)
- Buildings / Urban Areas
- Watercourses

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	2nd Draft			
P1	19/02/09	BF	CF	SH
	1st Draft			

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ROADS Service

Job Title

A8 Dualling
Belfast to Larne

Drawing Title

Section C - Northern Section
Route C1

Scale at A1 1:10000

Discipline

Drawing Status

Final

Job No	Drawing No	Issue
124785-00	A8_S2_HWY_010	P4

J:\124000\124785-00\4 Internal Project Data\4-30 Drawings\4-33 Civil\CH_Highways\Temp Microstation Files\A8_S2_HWY_010.dgn

C1 DMRB Route Assessment Methodology

C1.1 Engineering Assessment

An engineering assessment of each corridor has been undertaken in accordance with the DMRB methodology in TD 37/93, and the following assessment criteria have been used:

- Geometry and Departures from Standard (DMRB TD9/93);
- Structures;
- Drainage;
- Utility Services;
- Geotechnics; and
- Construction Issues.

C1.1.1 Geometry and Departures from Standard

The geometric composition of each option has been assessed in relation to the DMRB highway link design standards set out in TD 9/93. For the mainline each route has been assessed based on a 120kph design speed. All side roads have been assessed based on a design speed of 100kph. Any Departures from standards have been identified, and quantified in terms of steps below desirable minimum for the given design speeds.

C1.1.2 Structures

An assessment of the likely number and location of structures has been undertaken, identifying and summarising the key structural issues for each route.

C1.1.3 Drainage

An assessment of each route has considered the issues surrounding the proposed road drainage and associated cross drainage for each route. The impacts on watercourses and on the 1:100 year floodplain are covered in the environmental assessment (see Section B1.2).

C1.1.4 Utility Services

The potential impact of each route upon the existing utility services has been assessed.

C1.1.5 Geotechnics

Geology, geomorphology and ground conditions have been assessed for each option based on the Stage 1 desk-based study and the more recent Stage 2 Preliminary Ground Investigation works.

C1.1.6 Construction Issues

Constructability is an important issue for route comparison. The potential construction issues associated with each route has been considered. However, at this stage they are generally limited to the traffic management issues.

C1.2 Environmental Assessment

An environmental assessment has been undertaken in accordance with the requirements of DMRB Volume 11: *Environmental Assessment*. The assessment has considered the following new topics for environmental assessments defined within Volume 11 (Section 1, Part 1).

- Air Quality;
- Cultural Heritage;
- Landscape;
- Nature Conservation;

- Materials;
- Noise;
- Effects on All Travellers;
- Community and Private Assets; and
- Road Drainage and the Water Environment.

The full details of the Stage 2 environmental assessment of the routes have been reported in a separate report, entitled *'A8 Belfast to Larne Dual Carriageway (Coleman's Corner to Ballyrickard Road): Stage 2 Environmental Report, 2009'*.

C1.3 Cost Estimates

The Stage 2 cost estimates for each route have been developed based on the Stage 2 design and informed by the engineering and environmental assessments, detailed in sections C1.1 and C1.2.

C1.3.1 Cost-Estimate Assumptions

The following comments or exclusions apply to the costing for all of the routes:

- estimates were based on prices from three road projects in Northern Ireland and the Republic of Ireland, adjusted to prices at 1st Quarter 2009;
- costs were based on either initial quantities/designs developed during Stage 2 or an indicative rate per m^2 where initial designs are not available;
- the estimate included for the preparation and supervision of the scheme at 9% and 5% of construction cost, respectively;
- contractor's overheads and profit were included at 10%;
- by using a combination of target cost, actual cost and forecast out-turn cost data, the cost estimate for each corridor represented an assessment of the eventual out-turn cost of the project;
- optimism bias and a risk allowance was included (see section C1.3.2); and
- all costs excluded VAT.

C1.3.2 Optimism Bias and Risk Allowance

The general Optimism Bias contingency is the same for all the routes and has been calculated at 20% for the Stage 2 based on a combination of the Roads Service guidance DEM 91/05 and the Highways Agency guidance, Major Projects Directors Instruction 06/07 Annex 1. The Optimism Bias contingency of 5% for the Land and Compensation costs is as estimated following discussions with Lands and Property Services.

The Contingency/Risk Allowance costs detailed in the Stage 2 Cost Estimate are based on the risk identified in the Stage 2 Risk Register. The @Risk software has been used to model the probability and severity of the residual risks to produce a quantified risk contingency cost.

C1.4 Traffic

Traffic forecasts have been derived from a validated base year model in accordance with DMRB guidance. Forecasts have been prepared for the future year scenarios without the A8 dualling scheme in place (do-minimum) and also with the different options for the A8 dualling scheme (do-something).

C1.5 Economy Assessment

The TUBA software has been used to assess and compare the economic aspects of the each route option. TUBA is a standard approach, approved by the Department of Transport, for assessing the economic impacts of a road scheme and is in accordance with guidance given in DMRB. The economic impacts of the routes options have been assessed in terms of the following:

- Journey time savings;
- Vehicle operating costs:
- Costs to road users during construction and maintenance works;
- Carbon emissions; and
- Accident costs.

All of the above are converted into monetary values using default values given in the guidance. The economic assessment covers a 60-year period, starting from the opening year of the scheme. The economic benefits are calculated based on cost savings without the new road scheme in place (do-minimum). The monetary benefits are derived from each of the elements listed above, calculated across the whole 60-year period and discounted back to a default economic base year of 2002. These benefits are summarised in the Transport Economic Efficiency (TEE) tables, include the summary statistics, such as net present value (NPV) and benefit to cost ratio (BCR).

C2 WebTAG Route Appraisal Methodology

The WebTAG scheme appraisal has been informed by the DMRB assessment, as summarised in Table C2.1, and supplemented with additional information as required.

Table C2.1: Comparison between WebTAG Objectives and DMRB Assessment

WebTAG Objectives		DMRB Assessment
Environment	Noise	Environmental - Noise
	Local Air Quality	Environmental - Air Quality
	Greenhouse Gases	Environmental - Air Quality
	Landscape	Environmental - Landscape
	Townscape	Environmental - Landscape
	Biodiversity	Environmental – Nature Conservation
	Heritage/Historical Resources	Environmental – Cultural Heritage
	Water Environment	Environmental – Road Drainage and Water Environment
	Physical Fitness	Environmental – Effect on All Travellers
	Journey Ambience	Environmental - Effect on All Travellers
Safety	Accidents	Economic – Accident Benefits
	Security	-
Economy	Public Accounts	Cost Estimate and Economic Assessment
	Transport Economic Efficiency	Economic Assessment
	Reliability	Traffic Assessment
	Wider Economic Impacts	-
Accessibility	Option Values	-
	Severance	Environmental – Community and Private Assets, and the Traffic Assessment
	Access to the Transport System	-
Integration	Transport Interchange	-
	Land Use Policy	-
	Other Government Policies	-
Supporting Analysis	Affordability	Cost Estimate
	Practicality	Engineering – Construction Issues
	Public Acceptability	Public Consultation

C2.1 Environmental Objective

The environment objective comprises ten sub-objectives:

- Noise;
- Local Air Quality;
- Greenhouse Gases;
- Landscape;
- Townscape;
- Biodiversity;
- Heritage and Historic Resources;
- Water Environment;
- Physical Fitness; and
- Journey Ambience.

C2.1.1 Noise

The WebTAG method draws on the information collected as part of DMRB Noise Assessment. The appraisal score for noise is derived from WebTAG Unit 3.3.2.

C2.1.2 Local Air Quality

The WebTAG method draws on the information collected as part of DMRB Air Quality Assessment. The appraisal score for noise is derived from WebTAG Unit 3.3.3.

C2.1.3 Greenhouse Gases

The WebTAG method draws on the information collected as part of DMRB Air Quality Assessment and the TUBA model using for the DMRB Economic Assessment. The appraisal score for noise is derived from WebTAG Unit 3.3.5.

C2.1.4 Landscape and Townscape

The WebTAG method draws on the information collected as part of DMRB Landscape Assessment. The appraisal score for Landscape and Townscape is derived from WebTAG Unit 3.3.6, 3.3.7 and 3.3.8.

C2.1.5 Heritage/Historic Resources

The WebTAG method draws on the information collected as part of DMRB Cultural Heritage Assessment. The appraisal score is derived from WebTAG Unit 3.3.6 and 3.3.9.

C2.1.6 Biodiversity

The biodiversity resource draws on the information collected as part of DMRB nature conservation assessment. The appraisal score is derived from WebTAG Unit 3.3.6 and 3.3.10.

C2.1.7 Water Environment

The WebTAG method draws on the information collected as part of DMRB Water Environment Assessment. The magnitude and significance of the potential impact on a water feature is assessed in line with the methodology described in WebTAG Unit 3.3.6 and 3.3.11.

C2.1.8 Physical Fitness

Taking the information produced from the DMRB Effects on All Travellers assessment, the impact on physical fitness has been appraised in line with the methodology described in WebTAG unit 3.3.12.

C2.1.9 Journey Ambience

Taking the information produced from the DMRB Effects on All Travellers assessment, the impact on journey ambiance has been appraised in line with the methodology described in WebTAG unit 3.3.13.

C2.2 Safety Objective

The safety objective comprises two sub-objectives:

- Accident Sub-objective; and
- Security Sub-objective.

C2.2.1 Accidents

In accordance with WebTAG Unit 3.4.1 the accident sub-objective has been assessed based on a forecast of the number of accidents and an estimate of the monetary value of the different in accident numbers between two scenarios.

Taking the number of accidents and monetary value calculated as part of the DMRB Economic Assessment calculated (see Section C1.4), using the methods set out in the COBA Manual, an appraisal of the accident sub-objective has been made.

In addition to the quantitative assessment, a qualitative assessment undertaken by a Road Safety Auditor and a summary of main construction, operation, maintenance and demolitions risk (identified and considered in accordance with the Construction Design and Management (CDM) Regulations 2007) has been included in the appraisal of this sub-objective.

C2.2.2 Security

The security sub-objective has been assessed based on a qualitative assessment of the security of the new road itself. A coarse qualitative assessment has been included in the Appraisal Summary Table (AST) for each route option and is in accordance with the seven point scale detailed in WebTAG Unit 3.4.2. This sub-objective has not been considered in the comparison of the route options as there is no differentiation between them.

C2.3 Economy Objective

The economy objective comprises four sub-objectives in WebTAG:

- Public Accounts,
- Transport Economic Efficiency,
- Reliability, and
- Wider Economic Benefits.

C2.3.1 Public Accounts

The distribution of impacts between Governments and society is a key issue in the justification of Government action. Thus, the DfT requires an aggregation of costs that highlight the impact of a proposal on public accounts. At this stage of assessment an assessment of public accounts has been made based on operating costs, investment costs, and indirect tax revenues.

It should be noted that *DMRB Volume 13 (COBA Manual), section 1, chapter 4, paragraph 4.4* states that the default value year in COBA is 2002. This is in line with WebTAG guidance which states the base year for discounting, to which all costs and benefits should be discounted, is 2002. Therefore, the public account results are presented as 2002 prices in this report.

C2.3.2 Transport Economic Efficiency

For each route under consideration an assessment has been undertaken of the economic benefit due to the scheme, which is presented as the present value of benefits (PVB).

These benefits include:

- travel time (i.e. representing saving in travel time due to the scheme which is converted to monetary values based on the 'values of time');
- Vehicle Operating Cost Savings which are reductions in fuel consumption and in other non-fuel vehicle operating costs;
- user charges, which represent tolls and charges which are not applicable to this assessment and hence values as zero;
- the monetary effect of the scheme on carbon emissions; and
- Accident Benefits representing the possible monetary benefits of improving the safety of the road and reducing the number and severity of accidents.

In addition, an analysis of monetised costs and benefits has been produced to demonstrate the overall economic impacts of the corridors in terms of net present value (NPV) and benefit to cost ratio (BCR). The following limitations should be recognised when viewing the results:

- central traffic growth has been assumed;
- traffic forecast years have been taken as 2016 (notional scheme opening year) and 2031 (the design year);
- scheme costs include an optimism bias of 21% for construction costs and 5% for land and compensation;
- maintenance cost have been calculated using rates from DMRB Volumes 13 and 14 for annual routine and major maintenance respectively; and
- at this early stage of assessment, delays to road users due to maintenance works have not been included in this assessment.

As stated in section F4.2.1, *DMRB Volume 13 (COBA Manual), section 1, chapter 4, paragraph 4.4* states that the default value year in COBA is 2002. Therefore, the transport economic efficiencies are presented as 2002 prices in this report.

C2.3.3 Reliability

The reliability sub-objective has been assessed with reference to the driver 'stress' and therefore the Congestion Reference Flow (CRF) for the existing and the new route options. A coarse qualitative assessment has been included in the AST and is in accordance with the seven point scale detailed in WebTAG Unit 2.5.7. This sub-objective has not been considered in the comparison of the route options as there is negligible differentiation between them.

C2.3.4 Wider Economic Impacts

The wider economic impacts sub-objective is an assessment of the economic effects of the scheme outside those assessed in the other three economy sub-objectives. The primary purpose of this sub-objective is to appraise the wider economic impacts of a scheme designed to stimulate economic activity in a regeneration area. This could include such impacts as providing improved transport links to a rural area to facilitate regeneration and enhance the potential for increased investment.

The wider economic impacts sub-objective has not been assessed as this road improvement scheme is not located in a regeneration area and so the assessment of the wider economic impacts is not required.

C2.4 Accessibility Objective

The accessibility objective comprises three sub-objectives:

- Option Values,
- Severance, and
- Access to the Transport System.

C2.4.1 Option Values

WebTAG Unit 3.6.1 describes the corridor values sub-objective as particularly important for the scheme assessment if the scheme proposals will substantially change the availability of the transport services within the study area. This sub-objective is therefore mainly considered with the provision of new transport services, the removal of existing ones and the availability of these services. The assessment has been based on qualitative assessment using the seven point scale detailed in WebTAG Unit 3.6.1. The scoring has been presented in the AST's for each route option.

C2.4.2 Severance

This sub-objective is concerned with severance (as a result of a proposed scheme) to non-motorised modes, especially pedestrians. Cyclists and equestrians should also be considered but are less susceptible to severance because they can travel more quickly than people on foot. The severance sub-objective does not deal with individual land owner severance issues.

WebTAG Unit 3.6.2 provides a methodology for assessing severance which states it is usually appropriate to assess severance at a number of locations across the network. The majority of pedestrian movements across and in the vicinity of the A8 are in the village of Ballynure and this is considered a key point to assess.

C2.4.3 Access to the Transport System

The access to the Transport System sub-objective assesses the access to the transport system based on two key variables; availability of a vehicle for private use and the proximity to a public transport service. The assessment has been based on qualitative assessment using the seven point scale detailed in WebTAG Unit 3.6.3. The scoring has been presented in the AST's for each route option.

C2.5 Integration Objective

The integration objective comprises three sub-objectives:

- Transport Interchange,
- Land Use Policy, and
- Other Government Policies.

C2.5.1 Transport Interchanges

The Transport Interchanges sub-objective is aimed at assessing a scheme against the Government's objective of achieving truly integrated transport. With the lack of quantitative information on the populations affected at this stage, this has been assessed on qualitative basis using the seven point scale detailed in WebTAG Unit 3.7.1. The scoring has been presented in the AST's for each route option.

C2.5.2 Land Use Policy

The Land-use Policy Sub-Objective assesses the extent to which the route options are integrated with the land use proposals and policies. The current planning policy and legislation, has been outlined previously in Chapter 4 of this report.

C2.5.3 Other Government Policies

The Other Government Policies Sub-Objective assesses the effect of the new A8 scheme on the overall policy integration within Government.

C2.6 Supporting Analysis

In addition to the scheme assessment against the Government's five over-arching objectives of environment, economy, safety, integration and accessibility, which take the perspective of the overall public interest at a national level (as reported in the AST's), WebTAG affords the opportunity to assess the proposals against 'supporting analysis', which centres around the issues of Affordability, Practicality and Public Consultation/Public Acceptability. These supplementary objectives are focussed around specific users and funders of the proposals, rather than the general public which is the focus of the five over-arching objectives. Supporting analyses are likely to be of interest to Central Government and the regional and local authorities, as well as the local people.

C2.6.1 Affordability

The Affordability of each corridor is reported factually in the Stage 2 scheme costs within the route assessment chapters. This study has avoided commenting on whether a corridor is affordable, or not as this is a decision to be taken by the funding organisation.

C2.6.2 Practicality

The Practicality of each of the route options has been reported as part of the Construction Issues section of the DMRB Engineering Assessment of each corridor and has not been reported separately. This qualitative assessment has been used to inform the recommendation of the 'preferred route'.

C2.6.3 Public Acceptability

A Public Exhibition was held and the responses obtained through the public consultation, undertaken as part of the scheme assessment process (summarised in section 6), has been used to inform the recommendation of the 'Preferred Route'

Appendix D

Stage 2 Route Cost Estimates

A8 Dualling - Belfast to Larne

Chandler KBS
COST & PROJECT MANAGEMENT

Route Option	A1	A2	A3	B1	B2	B3	B4	B5	B6	C1	A2-B6-C1
Base Date	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009	1st Qtr 2009
Location	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland
Single / Dual Carriageway	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual	Dual
Length (km)	2.65 km	2.68 km	2.78 km	5.77 km	5.68 km	5.57 km	5.28 km	5.37 km	5.66 km	5.90 km	14.24 km
	£	£	£	£	£	£	£	£	£	£	£
Preliminaries	£ 2,414,745	£ 2,174,082	£ 2,032,804	£ 5,143,989	£ 5,320,272	£ 5,299,659	£ 5,398,490	£ 5,192,354	£ 5,440,507	£ 6,081,442	£ 13,696,031
Site Clearance	£ 76,659	£ 24,129	£ 25,029	£ 58,880	£ 58,069	£ 57,079	£ 50,838	£ 48,348	£ 57,889	£ 63,020	£ 145,038
Fencing & Environmental Barriers	£ 149,989	£ 175,962	£ 202,636	£ 541,794	£ 531,954	£ 533,735	£ 548,517	£ 539,589	£ 517,090	£ 437,777	£ 1,130,829
Safety Fences	£ 290,896	£ 241,095	£ 234,629	£ 790,864	£ 642,038	£ 635,902	£ 566,617	£ 592,881	£ 640,923	£ 601,201	£ 1,483,219
Drainage & Service Ducts	£ 875,629	£ 885,542	£ 918,584	£ 2,403,309	£ 2,460,909	£ 2,485,602	£ 2,491,244	£ 2,470,740	£ 2,396,113	£ 2,299,649	£ 5,581,304
Earthworks	£ 728,653	£ 1,255,136	£ 1,070,475	£ 9,247,833	£ 6,287,991	£ 7,617,489	£ 4,416,209	£ 3,939,867	£ 6,645,564	£ 4,219,434	£ 12,120,134
Pavements	£ 2,286,673	£ 2,347,947	£ 2,416,300	£ 6,510,034	£ 6,500,327	£ 6,490,523	£ 6,670,501	£ 6,349,044	£ 6,379,501	£ 5,725,498	£ 14,452,946
Kerbs & Footways	£ 379,652	£ 383,950	£ 398,277	£ 564,839	£ 596,936	£ 667,252	£ 619,691	£ 550,236	£ 635,582	£ 890,245	£ 1,909,778
Traffic Signs & Road Markings	£ 107,011	£ 108,223	£ 112,261	£ 293,710	£ 300,749	£ 299,490	£ 304,457	£ 300,881	£ 292,830	£ 278,292	£ 679,345
Street Lighting	£ 57,660	£ 57,660	£ 57,660	£ 195,044	£ 205,948	£ 211,810	£ 217,982	£ 203,918	£ 194,750	£ 134,512	£ 386,922
Electrical works	£ 96,593	£ 96,593	£ 96,593	£ 260,953	£ 288,934	£ 265,896	£ 332,588	£ 280,642	£ 272,325	£ 207,226	£ 576,144
Motorway Comms & Gantries	£ 31,603	£ 31,961	£ 33,154	£ 86,740	£ 88,819	£ 88,447	£ 89,914	£ 88,858	£ 86,481	£ 82,187	£ 200,628
Landscaping	£ 142,640	£ 144,255	£ 149,637	£ 391,499	£ 400,882	£ 399,203	£ 405,824	£ 401,058	£ 390,327	£ 370,948	£ 905,529
Structures	£ 256,095	£ 256,095	£ 256,095	£ 3,397,663	£ 3,447,663	£ 3,427,663	£ 3,018,845	£ 3,017,715	£ 3,397,663	£ 2,100,395	£ 5,754,153
Junctions	£ 320,910	£ 320,910	£ 320,910	£ 497,617	£ 497,617	£ 497,617	£ 497,617	£ 497,617	£ 497,617	£ 248,808	£ 1,067,335
Accommodation Works	£ 683,281	£ 691,017	£ 716,801	£ 1,624,011	£ 1,634,881	£ 1,618,160	£ 1,592,271	£ 1,584,834	£ 1,607,022	£ 1,649,100	£ 3,947,138
Works for Statutory & other Bodies	£ 389,177	£ 165,819	£ 135,819	£ 2,307,304	£ 2,546,109	£ 2,170,134	£ 1,959,120	£ 2,174,774	£ 2,185,639	£ 688,302	£ 3,039,760
Downgrade existing A8 through Ballynure	£ -	£ -	£ -	£ 46,104	£ 33,530	£ 33,530	£ 47,501	£ 48,898	£ 39,118	£ -	£ 39,118
Sub total	**£ 9,287,867**	**£ 9,360,374**	**£ 9,177,664**	**£ 34,362,187**	**£ 31,843,630**	**£ 32,799,192**	**£ 29,228,225**	**£ 28,282,255**	**£ 31,676,941**	**£ 26,078,036**	**£ 67,115,351**
Design (incl below)	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£ -
Contractors Overheads & Profit	£ 928,787	£ 936,037	£ 917,766	£ 3,436,219	£ 3,184,363	£ 3,279,919	£ 2,922,822	£ 2,828,225	£ 3,167,694	£ 2,607,804	£ 6,711,535
Total Construction Costs	**£ 10,216,653**	**£ 10,296,412**	**£ 10,095,430**	**£ 37,798,405**	**£ 35,027,993**	**£ 36,079,111**	**£ 32,151,047**	**£ 31,110,480**	**£ 34,844,635**	**£ 28,685,840**	**£ 73,826,886**
Preparation, surveys, design	£ 919,499	£ 926,677	£ 908,589	£ 3,401,856	£ 3,152,519	£ 3,247,120	£ 2,893,594	£ 2,799,943	£ 3,136,017	£ 2,581,726	£ 6,644,420
Supervision	£ 510,833	£ 514,821	£ 504,772	£ 1,889,920	£ 1,751,400	£ 1,803,956	£ 1,607,552	£ 1,555,524	£ 1,742,232	£ 1,434,292	£ 3,691,344
Sub total	**£ 11,646,985**	**£ 11,737,909**	**£ 11,508,791**	**£ 43,090,182**	**£ 39,931,912**	**£ 41,130,187**	**£ 36,652,194**	**£ 35,465,948**	**£ 39,722,883**	**£ 32,701,858**	**£ 84,162,650**
Risk Register	£ 499,525	£ 875,180	£ 894,030	£ 1,517,645	£ 1,500,680	£ 1,479,945	£ 995,280	£ 1,012,245	£ 1,496,910	£ 1,112,150	£ 3,484,240
Total Base Estimate	**£ 12,146,510**	**£ 12,613,089**	**£ 12,402,821**	**£ 44,607,827**	**£ 41,432,592**	**£ 42,610,132**	**£ 37,647,474**	**£ 36,478,193**	**£ 41,219,793**	**£ 33,814,008**	**£ 87,646,890**
Land Costs	£ 2,342,000	£ 1,046,500	£ 1,159,900	£ 4,001,300	£ 4,053,800	£ 3,708,200	£ 4,079,720	£ 3,933,060	£ 3,281,000	£ 3,402,750	£ 7,730,250
Compensation	incl above	incl above	incl above	incl above	incl above	incl above	incl above	incl above	incl above	incl above	incl above
Total Base Estimate	**£ 14,488,510**	**£ 13,659,589**	**£ 13,562,721**	**£ 48,609,127**	**£ 45,486,392**	**£ 46,318,332**	**£ 41,727,194**	**£ 40,411,253**	**£ 44,500,793**	**£ 37,216,758**	**£ 95,377,140**
Optimism Bias @ 20% (5% on lands)	£ 2,546,402	£ 2,574,943	£ 2,538,559	£ 9,121,630	£ 8,489,208	£ 8,707,436	£ 7,733,481	£ 7,492,292	£ 8,408,009	£ 6,932,939	£ 17,915,891
TOTAL ESTIMATED COSTS	**£ 17,034,912**	**£ 16,234,532**	**£ 16,101,280**	**£ 57,730,757**	**£ 53,975,600**	**£ 55,025,768**	**£ 49,460,675**	**£ 47,903,544**	**£ 52,908,802**	**£ 44,149,697**	**£ 113,293,031**

Appendix E

Appraisal Summary Tables Supporting Information

A8 Final TEE | A2B1C1

Economic Efficiency of the Transport System (TEE)

Consumers

User Benefits (£000)	All Modes		Road		Bus
Personal Travel	**Total**		Personal		Passengers
Travel Time	46,734		46,734		0
Vehicle Operating Costs	-6,691		-6,691		0
User Charges	0		0		0
During Construction & Maintenance	-2,285		-2,285		0
NET CONSUMER BENEFITS	**37,758**	*(1)*	37,758		0

Business

User Benefits			Personal	Freight	Passengers
Travel Time	95,819		50,834	44,985	0
Vehicle Operating Costs	-14,738		246	-14,984	0
User Charges	0		0	0	0
During Construction & Maintenance	-2,357		-1,220	-1,137	0
Subtotal	**78,724**	*(2)*	49,860	28,864	0

Private Sector Provider Impacts					
Revenue	0		0	0	0
Operating Costs	0		0	0	0
Investment Costs	0		0	0	0
Grant/Subsidy	0		0	0	0
Subtotal	**0**	*(3)*	0	0	0

Other Business Impacts			
Developer contributions	0	*(4)*	0
NET BUSINESS IMPACT	**78,724**	*(5) = (2) + (3) + (4)*	

TOTAL (£000)		
Present Value of Transport Economic Efficiency Benefits	**116,482**	*(6) = (1) + (5)*

Notes:

1) Benefits appear as positive numbers, while costs appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

A8 Final TEE | A2B1C1

Public Accounts

	All Modes Total		Road	Bus
Local Government Funding				
Revenue	0		0	0
Operating Costs	0		0	0
Investment Costs	0		0	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
NET IMPACT	**0**	*(7)*	0	0
Central Government Funding				
Revenue	0		0	0
Operating Costs	4,863		4,863	0
Investment Costs	91,159		91,159	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
Indirect Tax Revenues	-13,769		-13,769	0
NET IMPACT	**82,253**	*(8)*	82,253	0
TOTAL Present Value of Costs	**82,253**	*(9) = (7) + (8)*		

Notes:

1) Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs & Benefits

Consumer User Benefits	37,758	
Business User Benefits	78,724	
Private Sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	5,022	
Carbon Benefits	-2,618	
Present Value of Benefits (PVB)	**118,886**	
Local Government Funding	0	
Central Government Funding	82,253	
Present Value of Costs (PVC)	**82,253**	
OVERALL IMPACTS		
Net Present Value (£000)	**36,633**	NPV=PVB-PVC
Benefit to Cost Ratio	**1.45**	BCR=PVB/PVC

Notes:

This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which can

A8 TEE Table A2B2C1

Economic Efficiency of the Transport System (TEE)

Consumers

User Benefits (£000)	All Modes		Road		Bus
Personal Travel	**Total**		Personal		Passengers
Travel Time	46,734		46,734		0
Vehicle Operating Costs	-6,691		-6,691		0
User Charges	0		0		0
During Construction & Maintenance	-2,285		-2,285		0
NET CONSUMER BENEFITS	**37,758**	*(1)*	37,758		0

Business

User Benefits			Personal	Freight	Passengers
Travel Time	95,819		50,834	44,985	0
Vehicle Operating Costs	-14,738		246	-14,984	0
User Charges	0		0	0	0
During Construction & Maintenance	-2,357		-1,220	-1,137	0
Subtotal	**78,724**	*(2)*	49,860	28,864	0

Private Sector Provider Impacts					
Revenue	0		0	0	0
Operating Costs	0		0	0	0
Investment Costs	0		0	0	0
Grant/Subsidy	0		0	0	0
Subtotal	**0**	*(3)*	0	0	0

Other Business Impacts			
Developer contributions	0	*(4)*	0
NET BUSINESS IMPACT	**78,724**	*(5) = (2) + (3) + (4)*	

TOTAL (£000)		
Present Value of Transport Economic Efficiency Benefits	**116,482**	*(6) = (1) + (5)*

Notes:

1) Benefits appear as positive numbers, while costs appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

A8 TEE Table A2B2C1

Public Accounts

	All Modes Total		Road	Bus
Local Government Funding				
Revenue	0		0	0
Operating Costs	0		0	0
Investment Costs	0		0	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
NET IMPACT	**0**	*(7)*	0	0
Central Government Funding				
Revenue	0		0	0
Operating Costs	4,863		4,863	0
Investment Costs	88,224		88,224	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
Indirect Tax Revenues	-13,769		-13,769	0
NET IMPACT	**79,318**	*(8)*	79,318	0
TOTAL Present Value of Costs	**79,318**	*(9) = (7) + (8)*		

Notes:

1) Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs & Benefits

Consumer User Benefits	37,758	
Business User Benefits	78,724	
Private Sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	5,022	
Carbon Benefits	-2,618	
Present Value of Benefits (PVB)	**118,886**	
Local Government Funding	0	
Central Government Funding	79,318	
Present Value of Costs (PVC)	**79,318**	
OVERALL IMPACTS		
Net Present Value (£000)	**39,568**	NPV=PVB-PVC
Benefit to Cost Ratio	**1.50**	BCR=PVB/PVC

Notes:

This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which can

A8 TEE Table A2B3C1

Economic Efficiency of the Transport System (TEE)

Consumers

User Benefits (£000)	All Modes		Road		Bus
Personal Travel	**Total**		Personal		Passengers
Travel Time	46,734		46,734		0
Vehicle Operating Costs	-6,691		-6,691		0
User Charges	0		0		0
During Construction & Maintenance	-2,285		-2,285		0
NET CONSUMER BENEFITS	**37,758**	*(1)*	37,758		0

Business

User Benefits			Personal	Freight	Passengers
Travel Time	95,819		50,834	44,985	0
Vehicle Operating Costs	-14,738		246	-14,984	0
User Charges	0		0	0	0
During Construction & Maintenance	-2,357		-1,220	-1,137	0
Subtotal	**78,724**	*(2)*	49,860	28,864	0

Private Sector Provider Impacts					
Revenue	0		0	0	0
Operating Costs	0		0	0	0
Investment Costs	0		0	0	0
Grant/Subsidy	0		0	0	0
Subtotal	**0**	*(3)*	0	0	0

Other Business Impacts			
Developer contributions	0	*(4)*	0
NET BUSINESS IMPACT	**78,724**	*(5) = (2) + (3) + (4)*	

TOTAL (£000)		
Present Value of Transport Economic Efficiency Benefits	**116,482**	*(6) = (1) + (5)*

Notes:

1) Benefits appear as positive numbers, while costs appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

A8 TEE Table A2B3C1

Public Accounts

	All Modes Total		Road	Bus
Local Government Funding				
Revenue	0		0	0
Operating Costs	0		0	0
Investment Costs	0		0	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
NET IMPACT	**0**	*(7)*	0	0
Central Government Funding				
Revenue	0		0	0
Operating Costs	4,863		4,863	0
Investment Costs	89,084		89,084	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
Indirect Tax Revenues	-13,769		-13,769	0
NET IMPACT	**80,178**	*(8)*	80,178	0
TOTAL Present Value of Costs	**80,178**	*(9) = (7) + (8)*		

Notes:

1) Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs & Benefits

Consumer User Benefits	37,758	
Business User Benefits	78,724	
Private Sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	5,022	
Carbon Benefits	-2,618	
Present Value of Benefits (PVB)	**118,886**	
Local Government Funding	0	
Central Government Funding	80,178	
Present Value of Costs (PVC)	**80,178**	
OVERALL IMPACTS		
Net Present Value (£000)	**38,708**	NPV=PVB-PVC
Benefit to Cost Ratio	**1.48**	BCR=PVB/PVC

Notes:

This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which can

A8 TEE Table A2B4C1

Economic Efficiency of the Transport System (TEE)

Consumers

User Benefits (£000)	All Modes		Road		Bus
Personal Travel	**Total**		Personal		Passengers
Travel Time	42,698		42,698		0
Vehicle Operating Costs	-8,100		-8,100		0
User Charges	0		0		0
During Construction & Maintenance	-2,285		-2,285		0
NET CONSUMER BENEFITS	**32,313**	*(1)*	32,313		0

Business

User Benefits			Personal	Freight	Passengers
Travel Time	83,243		45,021	38,222	0
Vehicle Operating Costs	-16,887		-243	-16,644	0
User Charges	0		0	0	0
During Construction & Maintenance	-2,357		-1,220	-1,137	0
Subtotal	**63,999**	*(2)*	43,558	20,441	0

Private Sector Provider Impacts					
Revenue	0		0	0	0
Operating Costs	0		0	0	0
Investment Costs	0		0	0	0
Grant/Subsidy	0		0	0	0
Subtotal	**0**	*(3)*	0	0	0

Other Business Impacts			
Developer contributions	0	*(4)*	0
NET BUSINESS IMPACT	**63,999**	*(5) = (2) + (3) + (4)*	

TOTAL (£000)		
Present Value of Transport Economic Efficiency Benefits	**96,312**	*(6) = (1) + (5)*

Notes:

1) Benefits appear as positive numbers, while costs appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

A8 TEE Table A2B4C1

Public Accounts

	All Modes Total		Road	Bus
Local Government Funding				
Revenue	0		0	0
Operating Costs	0		0	0
Investment Costs	0		0	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
NET IMPACT	**0**	*(7)*	0	0
Central Government Funding				
Revenue	0		0	0
Operating Costs	4,905		4,905	0
Investment Costs	84,694		84,694	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
Indirect Tax Revenues	-14,269		-14,269	0
NET IMPACT	**75,330**	*(8)*	75,330	0
TOTAL Present Value of Costs	**75,330**	*(9) = (7) + (8)*		

Notes:

1) Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs & Benefits

Consumer User Benefits	32,313	
Business User Benefits	63,999	
Private Sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	2,836	
Carbon Benefits	-2,708	
Present Value of Benefits (PVB)	**96,440**	
Local Government Funding	0	
Central Government Funding	75,330	
Present Value of Costs (PVC)	**75,330**	
OVERALL IMPACTS		
Net Present Value (£000)	**21,110**	NPV=PVB-PVC
Benefit to Cost Ratio	**1.28**	BCR=PVB/PVC

Notes:

This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which can

A8 TEE Table A2B5C1

Economic Efficiency of the Transport System (TEE)

Consumers

User Benefits (£000)	All Modes		Road		Bus
Personal Travel	**Total**		Personal		Passengers
Travel Time	44,607		44,607		0
Vehicle Operating Costs	-8,664		-8,664		0
User Charges	0		0		0
During Construction & Maintenance	-2,285		-2,285		0
NET CONSUMER BENEFITS	**33,658**	*(1)*	33,658		0

Business

User Benefits			Personal	Freight	Passengers
Travel Time	85,025		45,591	39,434	0
Vehicle Operating Costs	-18,248		-520	-17,728	0
User Charges	0		0	0	0
During Construction & Maintenance	-2,357		-1,220	-1,137	0
Subtotal	**64,420**	*(2)*	43,851	20,569	0

Private Sector Provider Impacts					
Revenue	0		0	0	0
Operating Costs	0		0	0	0
Investment Costs	0		0	0	0
Grant/Subsidy	0		0	0	0
Subtotal	**0**	*(3)*	0	0	0

Other Business Impacts			
Developer contributions	0	*(4)*	0
NET BUSINESS IMPACT	**64,420**	*(5) = (2) + (3) + (4)*	

TOTAL (£000)		
Present Value of Transport Economic Efficiency Benefits	**98,078**	*(6) = (1) + (5)*

Notes:

1) Benefits appear as positive numbers, while costs appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

A8 TEE Table A2B5C1

Public Accounts

	All Modes Total		Road	Bus
Local Government Funding				
Revenue	0		0	0
Operating Costs	0		0	0
Investment Costs	0		0	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
NET IMPACT	**0**	*(7)*	0	0
Central Government Funding				
Revenue	0		0	0
Operating Costs	5,011		5,011	0
Investment Costs	83,498		83,498	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
Indirect Tax Revenues	-14,982		-14,982	0
NET IMPACT	**73,527**	*(8)*	73,527	0
TOTAL Present Value of Costs	**73,527**	*(9) = (7) + (8)*		

Notes:

1) Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs & Benefits

Consumer User Benefits	33,658	
Business User Benefits	64,420	
Private Sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	2,815	
Carbon Benefits	-2,842	
Present Value of Benefits (PVB)	**98,051**	
Local Government Funding	0	
Central Government Funding	73,527	
Present Value of Costs (PVC)	**73,527**	
OVERALL IMPACTS		
Net Present Value (£000)	**24,524**	NPV=PVB-PVC
Benefit to Cost Ratio	**1.33**	BCR=PVB/PVC

Notes:

This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which can

A8 TEE Table A2B6C1

Economic Efficiency of the Transport System (TEE)

Consumers

User Benefits (£000)	All Modes		Road		Bus
Personal Travel	**Total**		Personal		Passengers
Travel Time	46,734		46,734		0
Vehicle Operating Costs	-6,691		-6,691		0
User Charges	0		0		0
During Construction & Maintenance	-2,285		-2,285		0
NET CONSUMER BENEFITS	**37,758**	*(1)*	37,758		0

Business

User Benefits			Personal	Freight	Passengers
Travel Time	95,819		50,834	44,985	0
Vehicle Operating Costs	-14,738		246	-14,984	0
User Charges	0		0	0	0
During Construction & Maintenance	-2,357		-1,220	-1,137	0
Subtotal	**78,724**	*(2)*	49,860	28,864	0

Private Sector Provider Impacts					
Revenue	0		0	0	0
Operating Costs	0		0	0	0
Investment Costs	0		0	0	0
Grant/Subsidy	0		0	0	0
Subtotal	**0**	*(3)*	0	0	0

Other Business Impacts			
Developer contributions	0	*(4)*	0
NET BUSINESS IMPACT	**78,724**	*(5) = (2) + (3) + (4)*	

TOTAL (£000)		
Present Value of Transport Economic Efficiency Benefits	**116,482**	*(6) = (1) + (5)*

Notes:

1) Benefits appear as positive numbers, while costs appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

A8 TEE Table A2B6C1

Public Accounts

	All Modes Total		Road	Bus
Local Government Funding				
Revenue	0		0	0
Operating Costs	0		0	0
Investment Costs	0		0	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
NET IMPACT	**0**	*(7)*	0	0
Central Government Funding				
Revenue	0		0	0
Operating Costs	4,863		4,863	0
Investment Costs	87,483		87,483	0
Developer & Other Contributions	0		0	0
Grant/Subsidy Payments	0		0	0
Indirect Tax Revenues	-13,769		-13,769	0
NET IMPACT	**78,577**	*(8)*	78,577	0
TOTAL Present Value of Costs	**78,577**	*(9) = (7) + (8)*		

Notes:

1) Costs appear as positive numbers, while revenues and developer contributions appear as negative numbers.

2) All entries are present values discounted to 2002, in 2002 prices

Analysis of Monetised Costs & Benefits

Consumer User Benefits	37,758	
Business User Benefits	78,724	
Private Sector Provider Impacts	0	
Other Business Impacts	0	
Accident Benefits	5,022	
Carbon Benefits	-2,618	
Present Value of Benefits (PVB)	**118,886**	
Local Government Funding	0	
Central Government Funding	78,577	
Present Value of Costs (PVC)	**78,577**	
OVERALL IMPACTS		
Net Present Value (£000)	**40,309**	NPV=PVB-PVC
Benefit to Cost Ratio	**1.51**	BCR=PVB/PVC

Notes:

This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which can

Appendix F

Risk Register