



A6 Londonderry to Dungiven Dualling - Section 2, Claudy to Dungiven
Stage 2 Scheme Assessment Report

Roads Service - Northern Division
July 2009

Prepared by:  ..
Claire McDowell
Graduate Consultant

Checked by: 
.....
Tim Robinson
Regional Director

Approved by: 
.....
Tim Robinson
Regional Director

A6 Londonderry to Dungiven Dualling - Section 2, Claudy to Dungiven - Stage 2 Scheme Assessment Report

Rev No	Comments	Checked by	Approved by	Date
0	Stage 2 Scheme Assessment Report Initial Draft	TJR	TJR	30.03.09
1	Stage 2 Scheme Assessment Report Draft	TJR	TJR	11.05.09
2	Stage 2 Scheme Assessment Report Final	TJR	TJR	08.07.09

24 Linenhall Street, Belfast, BT2 8BG
Telephone: 028 9060 7200 Fax: 028 9060 7399 Website: <http://www.aecom.com>

Job No 55269 TBLE Reference Stage 2 SAR Date Created July 2009

This document has been prepared by AECOM Limited ("AECOM") for the sole use of our client (the "Client") and in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document.

No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

List of Abbreviations	4
Executive Summary	6
1 Introduction	7
1.1 The Commission	7
1.2 Strategic Context	7
1.3 Strategic Road Improvements	7
1.4 Consultant’s Brief.....	8
1.5 Preferred Route Corridor	8
1.6 Initial Route Alternatives	9
1.7 Assessment of Approved Route Options.....	9
2 Summary of Existing Conditions	10
2.1 Description of Locality.....	10
2.2 Existing Highway Network	10
2.3 Overview of Existing Traffic Situation	11
2.4 Geology and Geomorphology.....	12
2.5 Mining and Quarrying.....	12
2.6 Hydrology, Hydrogeology and Drainage.....	13
2.7 Public Utilities.....	13
2.7.1 Northern Ireland Water	14
2.7.2 British Telecom (BT).....	14
2.7.3 Northern Ireland Electricity (NIE).....	14
2.7.4 Street Lighting.....	14
2.8 Major Alignment Constraints.....	14
3 Summary of Planning Factors	16
3.1 Regional Strategies.....	16
3.1.1 Shaping Our Future – Regional Development Strategy for Northern Ireland 2025	16
3.1.2 Shaping Our Future – Adjustments to the Regional Development Strategy for Northern Ireland 2025.....	16
3.1.3 Strategic Planning Guidelines ENV 1 – ENV 7.....	17
3.1.4 Regional Strategic Transport Network Transport Plan 2015.....	17
3.2 Investment Strategy for Northern Ireland	17
3.3 Investment Delivery Plan for Roads	18
4 Summary of Alternative Schemes	19
4.1 Introduction	19
4.2 Geometric Standards and Cross Sections	19
4.3 Route Option Descriptions	20
4.3.1 Section 1 - Red Route.....	20
4.3.2 Section 1 - Purple Route.....	20
4.3.3 Section 1 - Yellow Route	20
4.3.4 Section 2 – Red Route.....	20
4.3.5 Section 2 – Purple Route	20
4.3.6 Section 2 – Brown Route	21
4.3.7 Section 2 - Blue Route.....	21
4.3.8 Section 2 - Cyan Route.....	21
5 Summary of Public Consultation	23
5.1 Background.....	23
5.2 Information Available	23
5.3 Progress.....	23

6	Summary of Engineering Appraisal	24
6.1	Geometry	24
6.1.1	Link Proposals	24
6.1.2	Junction Proposals.....	25
6.1.3	Severance and Side Road Proposals.....	26
6.2	Roadworks	27
6.3	Geotechnical Features.....	28
6.3.1	Bedrock.....	28
6.3.2	Glacial Till	28
6.3.3	Glaciofluvial Sheet Deposits	29
6.3.4	Glaci-lacustrine Clays	29
6.3.5	Alluvium	29
6.3.6	Peat.....	29
6.3.7	Section 1	30
6.3.8	Section 2	31
6.3.9	Topography.....	33
6.4	Hydrology, Hydrogeology and Drainage.....	33
6.5	Earthworks	34
6.6	Structures.....	35
6.6.1	Section 1 - Red Route.....	35
6.6.2	Section 1 - Purple Route.....	36
6.6.3	Section 1 - Yellow Route	36
6.6.4	Section 2 - Red Route.....	37
6.6.5	Section 2 - Purple Route.....	37
6.6.6	Section 2 - Brown Route.....	37
6.6.7	Section 2 - Blue Route.....	38
6.6.8	Section 2 - Cyan Route.....	38
6.6.9	Summary.....	38
6.7	Public Utilities.....	38
6.7.1	Firmus Energy.....	39
6.7.2	Phoenix Natural Gas.....	39
6.7.3	BGE Northern Ireland	39
6.7.4	Road Service (Street Lighting).....	39
6.7.5	Northern Ireland Electricity	39
6.7.6	BT Northern Ireland	39
6.7.7	Northern Ireland Water	39
6.7.8	Conclusions	39
6.8	Land and Property Take	40
6.9	Buildability.....	40
6.10	Health and Safety	41
7	Summary of Environmental Impact Assessment	43
7.1	Overview	43
7.2	Air Quality	43
7.2.1	Local Air Quality.....	43
7.2.2	Regional Pollution and Greenhouse Gases	43
7.2.3	Sensitive Ecosystems.....	43
7.3	Cultural Heritage	44
7.4	Disruption Due to Construction.....	44
7.5	Ecology and Nature Conservation	45
7.5.1	Section 1: Claudy to Dernaflaw	45
7.5.2	Section 2: Dungiven Bypass.....	45
7.6	Landscape Effects	45
7.7	Land Use.....	46
7.8	Traffic, Noise and Vibration	47
7.8.1	Section 1 Claudy to Dernaflaw	47
7.8.2	Section 2 Dungiven Bypass.....	47
7.9	Pedestrians, Cyclists, Equestrians and Community Effects.....	47
7.10	Vehicle Travellers	48
7.11	Road Drainage and the Water Environment.....	48
7.12	Geology and Soils.....	49
7.12.1	Section 1: Claudy to Dungiven	49

7.12.2	Section 2: Dungiven Bypass	49
7.13	Impact of Road Schemes on Policies and Plans	50
7.14	Overall Conclusion	50
8	Summary of Traffic and Economics Appraisal	52
8.1	Introduction	52
8.2	Methodology to Assess Monetary Costs and Benefits	52
8.2.1	Basic Data	52
8.2.2	Traffic Flows	52
8.2.3	Vehicle Category Proportions	52
8.2.4	Traffic Growth	52
8.2.5	Link Classification	52
8.2.6	Junction Classification	52
8.2.7	Accident Data	53
8.2.8	Model Validation	53
8.2.9	Scheme Costs	53
8.2.10	COBA Do Minimum Network	53
8.2.11	COBA Do Something Network	53
8.3	Operational Appraisal	54
8.3.1	Base Traffic Model	54
8.3.2	Automatic Traffic Count Surveys	54
8.3.3	Journey Time Surveys	54
8.4	Road Safety	55
8.5	Economic Appraisal	55
8.5.1	General	55
8.5.2	QUADRO	55
8.6	Sensitivity Tests	56
9	Summary of Cost Estimates	59
9.1	Rates Summary	59
9.1.1	Explanation of the Rates used for Cost Estimates	59
9.1.2	Source	59
9.1.3	Assumptions	59
9.1.4	Sensitivity of Cost Estimates	59
9.1.5	Land & Property Costs and Source	60
9.2	Cost Summary	60
10	Summary Tables	61
10.1	Introduction	61
10.2	The Environmental Objective	61
10.3	The Safety Objective	61
10.3.1	Accidents	61
10.4	Economy Objective	61
10.4.1	Transport Economic Efficiency	62
10.4.2	Reliability	62
10.5	Accessibility Objective	62
10.5.1	Severance	62
10.5.2	Access to Transport System	62
10.6	Integration Objective	62
10.6.1	Transport Interchange	62
10.6.2	Land Use Policy	62
10.6.3	Government Policies	62
10.7	Summary Tables	63
11	Conclusions and Recommendations	64
11.1	Introduction	64
11.2	Conclusions and Recommendations	64
	Appendix 1	61
	Table 1 - Geometry Review – Section 1	24
	Table 2 - Geometry Review – Section 2	25
	Table 3 - Junction Locations – Section 2	26

Table 4 - New Means of Access – Section 1	27
Table 5 - New Means of Access – Section 2	27
Table 6 - Roadworks – Section 1	27
Table 7 - Roadworks - Section 2	28
Table 8 - Drainage Review Section 1	33
Table 9 - Drainage Review Section 2	34
Table 10 - Earthworks - Section 1	35
Table 11 - Earthworks - Section 2	35
Table 12 - Structures Review - Section 1	38
Table 13 - Structures Review - Section 2	38
Table 14 - Property Take/ Land Use Review - Section 1	40
Table 15 - Property Take/ Land Use Review – Section 2	40
Table 16 - Buildability – Section 1	41
Table 17 - Buildability - Section 2	41
Table 18 - COBA TEE Table	57
Table 19 - Preferred Route combined costs	58
Table 20 - Cost Summary Section 1	60
Table 21 - Cost Estimate Summary Section 2	60
Figure 1 - Study Area	66
Figure 2 - Index Drawing for all routes	67

List of Abbreviations

ABBREVIATION	EXPLANATION
µg/m³	Microgram per cubic metre
AADT	Annual Average Daily Flow
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
ASSI	Area of Special Scientific Interest. Site of national importance designed under the Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 by DOE EH. Sites may be designated to protect wildlife, geology or land forms.
ATC	Automatic Traffic Counter
BCR	Benefit to Cost Ratio
BGE	Bord Gais Eireann
BH	Type B High
BL	Type B Low
BMA	Belfast Metropolitan Area
BMV	Best and most Versatile
BT	British Telecom
CBR	California Bearing Ratio
ch	Chainage
COBA	Cost Benefit Analysis
cSAC	Candidate Special Area of conservation
D2AP	Dual 2 Lane All Purpose
dB	Decibel
DMRB	Design Manual for Roads and Bridges. A comprehensive manual system which accommodates all current standards, advice notes and other published documents relating to the design, assessment and operation of trunk roads.
DRD	Department for Regional Development
E Factor	Conversion Factor for converting 12hr to 16hr flow within COBA
ESCR	Earth Science Conservation Review
EU	European Union
GAA	Gaelic Athletic Association
GSJ	Grade Separated Junction
HGV	Heavy Goods Vehicles
IDP	Investment Delivery Plan
ISNI	Investment Strategy for Northern Ireland
KTC	Key Transport Corridor

ABBREVIATION	EXPLANATION
LGV	Light Goods Vehicle
LLPA	Local Landscape Policy Area, as defined in the local area plan.
LPS	Land and Property Services
m	Metre
M Factor	Conversion factor to calculate the Annual All Vehicle Flow within COBA
MBR	Monuments and Buildings Record
MCC	Manual Classified Counts
NIE	Northern Ireland Electricity
NIEA	Northern Ireland Environment Agency
NMU	Non Motorised User
NO2	Nitrogen Dioxide
NOX	Oxides of Nitrogen
NPV	Net Present Value
NRTF	National Road Traffic Forecasts
OD	Origin to Destination Surveys
OS	Ordnance Survey
PM10	Airborne particles measuring 10 µm or less is the standard designed to identify those particles likely to be inhaled by humans. PM10 is the generally accepted measure of particulate material in the atmosphere in the UK and in Europe.
PPS	Planning Policy Statement
PVB	Present Value of Benefits
PVC	Present Value of Costs
PWD	Potato Wart Disease
QUADRO	Queues and Delays at Roadworks
RC	Roman Catholic
RDS	The Regional Development Strategy
RSPPG	Roads Service Policy and Procedure Guide
RSTN	Regional Strategic Transport Network
RSTN TP	Regional Strategic Transport Network Travel Plan
RTS	Regional Transport Strategy
SAC	Special Area of Conservation. Conservation areas designated under the EC Habitats Directive.
SPG's	Strategic Planning Guidelines
SRI	Strategic Road Improvements
SuDS	Sustainable Drainage Systems
TEE	Transport Economic Efficiency
WebTAG	Transport Analysis Guidance Website
YMCA	Young Men's Christian Association

Executive Summary

This report summarises a Stage 2 Scheme Assessment for the dualling of the A6 between Claudy and Dungiven including a bypass of Dungiven.

Six potential alignment options were developed between Claudy and Dungiven including a bypass of Dungiven town, and have been assessed in terms of geometry, buildability, safety, cost, value for money and environmental impact. The six routes in question were each split into two sections: Section 1 between Claudy and the east of Foreglen with three alternatives i.e. Red, Purple and Yellow routes. Section 2, from the east of Foreglen to the east of Dungiven with five alternatives i.e. Red, Purple, Blue, Cyan and Brown options. All route options incorporate new compact grade separated junctions and the majority of the options have examined a range of options including online widening with off line deviations from the present A6.

The emerging preferred route is a combination of Section 1 Red and Section 2 Cyan.

In terms of construction costs, Section 2 Cyan is the cheapest option at £74.450m as it is the shortest route option with one new roundabout at Chapel Road to provide access to the bypass. Section 1 Red is the most expensive option but this is due to the longer length and the inclusion of two new compact grade separated junctions at Ballyhanedin Road and Killunaught Road.

In terms of environmental impact assessment, there is an overall slight preference for the Red route in Section 1 and the Cyan route in Section 2; however, these results are indicative at this stage as the selection of a single route option does not consider the complexity of the potential impacts within each individual discipline's assessment. A key consideration is the potential impact to the European designated site, the River Roe cSAC, arising from these routes; however, it appears at this stage that the cyan route will not have significant impacts on the cSAC with design mitigation in place. This will be further borne out by the ongoing appropriate assessment work being conducted (as required by the Habitats Directive 92/43/EEC and DMRB Interim Advice note 110/08).

The engineering assessment sought to examine the options and combine the most advantageous option from each section to establish the preferred route. Considering capital cost only, Section 1 Yellow route and Section 2 Cyan routes yield a capital cost of £133.0m. Considering the wider issues, Section 1 Red option being wholly offline will facilitate easy construction and reduce delays to traffic on the existing road which will be retained. Severance will also be reduced and school and local buses will continue to use the existing A6, it has the least number of roads to be stopped up and the fewest number of accesses to be provided and it is likely that this route will gain public support and its promotion through the statutory procedures will be more certain than that of online options. The preferred route for Section 2 is the Cyan option which is also mainly offline which has the same main advantages of the red route section 1.

In terms of cost benefit analysis and value for money the preferred route of Red/Cyan gives a combined benefit to cost ratio as calculated by COBA analysis of 1.064, demonstrating an efficient use of public resources.

1 Introduction

1.1 The Commission

On the 13th December 2005, the Secretary of State for Northern Ireland announced the inclusion of 30 km of dualling of the A6 from Londonderry to Dungiven in the Regional Network Transport Plan 2015, including a dual carriageway bypass of Dungiven.

Roads Service appointed two consultants, AECOM (formerly Faber Maunsell) and Scott Wilson, to work collaboratively to deliver the services required to progress the scheme.

AECOM has been commissioned to carry out a DMRB Stage 2 scheme assessment of a discrete length of the scheme from Claudy to Dungiven to examine scheme options and carry out appropriate assessment to enable selection of a preferred route. Scott Wilson has been given responsibility for the Londonderry to Claudy section see Figure 1.

1.2 Strategic Context

The scheme is set in the context of the Regional Strategic Transport Network Transport Plan (RSTN-TP) 2015. This was prepared by the Department for Regional Development and is based on the guidance set out in the Regional Development Strategy (RDS) and the Regional Transportation Strategy (RTS). The vision for transportation contained within the RDS, 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 RSTN-TP represents a balanced approach to meeting Northern Ireland’s strategic transport needs over the next 10 years or so, making a vital contribution to the social and economic development of the region.

The RSTN of Northern Ireland comprises the complete rail network, five Key Transport Corridors (KTCs), four Link Corridors, the Belfast Metropolitan Transport Corridors and the remainder of the trunk road network. The Plan consists of proposals for the maintenance, management and development of this transport network up to the end of 2015.

The KTCs are the top tier of the Region’s long distance routes connecting the cities and main towns to the major regional gateways and the Belfast Metropolitan Area (BMA) and are:

- (i) The Eastern Seaboard Corridor – road and rail links between BMA and Dublin and northward to Larne, improving access to Warrenpoint and Rosslare;
- (ii) The North Western Corridor – links the BMA to Londonderry, strengthening access to Belfast International Airport;
- (iii) The Northern Corridor – links the BMA to Antrim, Ballymena, Ballymoney, Coleraine, Limavady and Londonderry by road and rail;
- (iv) The Western Corridor – links west of Lough Neagh connecting Donegal, Londonderry, Strabane, Omagh and onward to Monaghan and Dublin; and
- (v) The South Western Corridor – links the BMA to Craigavon, the Fermanagh Lakelands, the Sperrins and to important cross-border routes.

1.3 Strategic Road Improvements

Strategic Road Improvements (SRIs) are major projects where the scheme cost is estimated to exceed £1.0m. The RTS recognises the key role that SRIs will play in delivering a modern, safe and sustainable transport system for Northern Ireland.

The main objectives of SRIs are to remove bottlenecks on the key network where lack of capacity is causing serious congestion and to improve the environment by providing bypasses to towns situated on the RSTN, relieving the effects of heavy through traffic.

Roads Service manages the delivery of SRIs through the following programmes:

- (i) Construction Programme - Schemes already under construction:
- (ii) Forward Planning Schedule – Schemes that perform well when assessed at feasibility stage using the 5 national criteria and which are expected to be implemented within the next 10 years or so (subject to clearing the statutory procedures, having a satisfactory economic appraisal and the availability of funds at the time);
- (iii) Forward Planning Schedule - Schemes that perform well when assessed at feasibility stage and which are expected to be implemented within the next 10 years or so (subject to clearing the statutory procedures, having a satisfactory economic appraisal and the availability of funds at the time); and
- (iv) Long Term Planning Schedule – The Long Term Planning Schedule is a list of SRI's, which are not expected to be started within the next 10 years but have a strategic benefit.

1.4

Consultant's Brief

The Scope of the work is detailed in the Project Brief and includes:

Identify changes in conditions since the Stage 1 Assessment

To identify factors and considerations in terms of the environment, engineering, economic and traffic constraints associated with the scheme proposals;

Assistance to Roads Service in taking the schemes through the necessary statutory procedures

Help Roads Service Project to establish a preferred procedures for procurement and construction of the scheme

This report summarises the validation, assessments and analysis for the A6 Claudy to Dungiven Dualling Scheme. The assessment is broken down into distinct areas including the:

- Consideration of alternative scheme options
- Preparation of Appraisal Summary Tables
- Preparation of scheme cost estimates
- Economic performance of the proposed options
- Consideration of programme for delivery

1.5

Preferred Route Corridor

The Stage 1 Scheme Review report, issued to Roads Service in February 2007, describes the work carried out prior to the current commission. The 'A6 Castledawson to Londonderry Dualling Stage 1 Scheme Review report' summarised the review carried out on 9 corridors between Castledawson to Drumahoe and 6 corridors between Drumahoe and Caw.

The Stage 1 report summarised the review of the corridors using the criteria defined in the Design Manual for Roads and Bridges (DMRB) and the Government's over-arching objectives for transport. Appraisal of the corridor options recommended that the preferred corridor for providing a new dual carriageway between Castledawson and Londonderry is within the existing A6 corridor.

The Stage 1 Scheme Review report recommended a corridor loosely based around the line of the existing road as the preferred corridor for a new dual carriageway between Castledawson Roundabout and Londonderry. A broad three-stage implementation strategy was recommended, namely:

- (i) Castledawson to Dungiven
- (ii) Dungiven to Drumahoe
- (iii) Drumahoe to Caw Roundabout / Stradreagh

Roads Service have decided to implement the Stage 1 Scheme Review reports' recommendation that the western section of the route, including a bypass of Dungiven, should

be taken forward at this stage, with the Castledawson to Dungiven stage progressed at a later date.

1.6

Initial Route Alternatives

The Initial Route Alternative report considered eleven options and evaluated these in terms of engineering, traffic, safety, economics, social and environmental impact and aims to demonstrate that no fundamentally different option exists which is superior to those is considered.

The following criteria were taken into account:

- a) needs of local traffic and specific road users;
- b) Requirements for access to property and adjacent development;
- c) Location of statutory undertakers' (SUs') Plant;
- d) Options for traffic management and safety during construction;
- e) Integration and accessibility criteria;
- f) Regional and local transport plans.

The brief required that during this appraisal process, consideration was given to alternative engineering and environmental options in order to determine the most cost effective solution for each option and Relaxations and Departures shall be incorporated only where these can be justified.

The report shall identify the following:

- a) All alternative options/route considered;
- b) Those options/routes recommended for further study;
- c) Those options/route where further study is not recommended;
- d) Significant environmental constraints or opportunities.
- e) An overall appraisal of structural implications for each alternative route considered.

1.7

Assessment of Approved Route Options

The assessment of the options was undertaken taking cognisance of DMRB guidance on scheme assessment reporting and methodology agreed between the two consultants.

2 Summary of Existing Conditions

2.1 Description of Locality

The existing conditions within the study area were described within the “A6 Castledawson to Londonderry Dualling Stage 1 Scheme Review” report. This section provides an overview of this information and to make known any further information that has been obtained since the “A6 Castledawson to Londonderry Dualling Stage 1 Scheme Review” report was issued.

The existing A6 carriageway examined as part of this study is approximately 15km long and generally runs in an easterly direction extending from a point approximately 1km east of the junction for Claudy to a point approximately 2km to the south east of the town of Dungiven. The route follows the Foreglen River valley before dropping 50m to the valley of the Owenbeg River and the flood plain of the River Roe lying to the west of Dungiven.

The route is generally rural in nature, though there are numerous private dwellings, farm buildings and public roads taking direct access. The alignment is constrained by hilly terrain and natural watercourses and although there are exceptions, the geometry of the existing road generally complies with the requirements of the DMRB.

2.2 Existing Highway Network

The existing A6 carriageway examined as part of this study is approximately 15km long and generally runs in a west-east corridor extending from a point approximately 1km east of the junction for Claudy to a point approximately 2km to the south east of the town of Dungiven. The route follows the Foreglen River valley before dropping 50m to the valley of the Owenbeg River and the flood plain of the River Roe lying to the west of Dungiven.

The route is generally rural in nature, though there are numerous private dwellings, farm buildings and public roads taking direct access. The alignment is constrained by hilly terrain and natural watercourses and although there are exceptions, the geometry generally complies with the requirements of DMRB.

As the A6 leaves the Claudy junction heading east, the existing two lane single carriageway drops in level towards a tributary of the Foreglen River before following the contours of Highland Hill which lies to the north. The route is known as Foreglen Road as it heads through the small community of Mulderg where a ghost island junction is formed at the junction with Gortilea Road which lies to both north and south of the A6.

Leaving Mulderg the carriageway widens to introduce 1m wide hard strips on each side and another ghost island junction is located at the junction of Ballyhanedin Road which again is severed by the A6 Foreglen Road. At this point, the route is constrained by the steep sided hill lying to the north and Foreglen River to the south.

As the route rises from the river valley, a wide 2+1 lane carriageway is introduced which provides an overtaking opportunity for east bound traffic, and a further right turn lane is provided for local side road traffic. As the overtaking lane is terminated beyond the crest, the carriageway narrows losing the hard strips and the road reverts to a wide, two lane, kerbed, single carriageway.

Several facilities for parking and numerous farm accommodation accesses have been provided on either side of the carriageway up to this point.

At the crest of the hill lying to the west of the village of Foreglen a hard shoulder is introduced and, as the road falls towards the crossing of the Foreglen River the road widens further as ghost island junctions and merge and diverge lanes provide access to Muldonagh Road and the community of Muldonagh Cottages.

As the Route crosses the Foreglen River, the ghost island marking is maintained and provides right turn opportunities to several side roads including the western access to the village of Foreglen. The carriageway is semi-urban in nature at this location with frequent private and public access signing and street lighting.

As the route rises passing the village of Foreglen which lies to the south, the ghosting and lighting stops, leaving a wide single carriageway with hard shoulders continuing to Gortnahey and Altahullion Wind Farm, and the eastern access to Foreglen.

This cross section is maintained for about 1 km as the road rises from the river valley towards Oville House and at the crest of the hill the hard shoulders terminate leaving a wide single carriageway road heading towards Dungiven. Beyond the crest of the hill a further ghost island is introduced to offer a right turn facility at the Killunaught Road which has been severed by the existing route, and at the junction with Derrychrier Road the hard shoulders are again introduced.

As the road drops to the Owenbeg River valley further ghost islands are incorporated within the existing cross section to give access to the community of Dernaflaw lying to the south. Beyond the Owenbeg River Bridge the hard shoulder drops as a ghost island is introduced giving access to a side road to the south but is reinstated immediately beyond the junction. A similar layout exists at the junction with the Feeny road as the A6 approaches the outskirts of Dungiven.

The A6 adopts the name of the Glenshane Road beyond this point and line marking introduces a narrowing of the route as it approaches the Roe River, beyond which the route adopts an urban character with central hatch markings, edge markings and street lighting, as it approaches Dungiven.

Dungiven town is sited on the southern side of Carn Hill, which slopes down towards the River Roe in the valley below. The A6 continues through Dungiven, along Main Street and Chapel Road and heads east towards the Glenshane Pass, between Craighmore and Carn Hill to the north, with Corrick Mountain to the south.

The existing road network is characterised by a series of A class and B class roads radiating from Dungiven:

- A6 to Belfast;
- A6 to Londonderry;
- B64 to (Garvagh);
- B74 to Feeny;
- B68 to Limavady; and
- B192 to Limavady.

There are also numerous C class roads and unclassified roads serving various hamlets, farms and individual dwellings in the area

Numerous statutory service providers traverse the Dungiven area forming potential constraints upon any improvement scheme. These include water mains and buried electricity cables. There are also services (electricity, sewerage, cable, water etc) associated with all the properties within the corridor and these will need to be protected or diverted as appropriate when construction takes place.

Within the Dungiven area, the average density of accesses along the route is approximately 10 per kilometre; this is defined as “high access density” in accordance with TD 9/93 ‘Highway Link Design’.

Once through Dungiven the route cross section returns to a wide single carriageway with ghost island markings providing refuge for right turning traffic.

2.3

Overview of Existing Traffic Situation

The existing A6 carries reasonably high volumes of traffic through the town of Dungiven causing severance and damaging the quality of life for residents. Traffic is slow moving partly due to local traffic turning, parking, loading and unloading, particularly on Main Street; there is considerable congestion at peak hours. With traffic continuing to grow, congestion will increase with consequential impacts.

Traffic surveys carried out in 2008 shows that the A6 between Claudy and Dungiven currently carries traffic flows in the order of 15,700 vehicles per day (AADT) with approximately 8% of this being heavy goods vehicles. This is comparable with flows on other rural key transport corridors in Northern Ireland

A Department of Transport document “Transport Statistics Great Britain 1995” recorded HGV content of 14.1% on motorways, 9.0% on non-built up major roads and an average of 6.9% on all roads.

2.4

Geology and Geomorphology

The general geology of the A6 route corridor consists of a mantle of Quaternary glacial drift of variable thickness overlying solid geology of Proterozoic (Dalradian) and Carboniferous age.

In the west from Claudy to just west of Dernaflaw the bedrock geology consists of Dalradian metamorphics of the Dart Formation. These rocks generally comprise a series of tightly folded schistose psammites and semipelites but with subsidiary meta-limestones and graphitic semipelites. In places the psammites are pebbly.

From west of Dernaflaw to the west of Dungiven bedrock comprises a sequence of unconfirmed sedimentary rocks which overlie the Dalradian basement. Just west of Dernaflaw a narrow band of conglomerates of the Spincha Burn Formation lie at rockhead. These are in turn overlain by interbedded sandstones, siltstones and mudstones of the Barony Glen Formation which forms the bedrock between Dernaflaw and Dungiven and underlie the western and northern parts of the town. The southern and eastern parts of Dungiven are again underlain by the Dart Formation which has been uplifted by faulting in this area.

The area in the immediate vicinity of Dungiven and to the west of the town is mantled with outwash sands and gravels and flat-topped deltaic deposits associated with late-glacial ice withdrawal. To the west of these deposits, the Fore Glen is largely characterised by sandy to clay diamict (till) deposits with a variable pebble to boulder content (“boulder clay”). Occasional small, dissected glaciofluvial deposits occur along the valley sides. Lacustrine clay deposits are present in the vicinity of Ballymoney, recording the presence of the ice dammed lakes into which the Dungiven deltas had prograded.

Peat is frequent along the valley slopes and along the bottoms of river valleys feeding into the Glen. Recent Alluvium is widespread along valley bottoms in the corridor, and is particularly extensive immediately to the south and west of Dungiven.

The existing A6 Road and new route corridor lies within a broad valley running west to east. A watershed is formed at elevations of approximately 125km OD at Ballymoney, roughly in the centre of the study area, whereby the valley and the Foreglen Burn fall westwards to Claudy whilst other minor streams flow eastwards to become tributaries of the Owenbeg River and River Roe. These wider rivers flow in a northerly direction to the west of Dungiven and are incised through superficial deposits. Bedrock is occasionally exposed in the beds of rivers and streams around the town. In the banks of the River Roe south of Dungiven, historical landslips have been recorded.

The study corridor generally lies on-line or to the south of the existing A6 road. One route is being considered which passes to the north of Dungiven. The routes initially (in the west) run close to the existing road along the side of the valley before, at various points, they swing southwards and descend to cross the valley floor and the flood plain of the River Roe before climbing the valley side again to tie in to the existing road to the southeast of Dungiven. The northerly route departs northwards from the line of the existing road to cross the floodplain of the Owenbeg River and River Roe, passing the north and east of Dungiven and climbing the valley side to re-join the existing road to the south east of the town.

2.5

Mining and Quarrying

Minerals such as alluvial gold and baryte, along with calcite, lead and pyrite deposits are present at a number of points to the north of the study area. These occur within the Dalradian rocks of the Dart Formation. The positions of these mineral workings do not directly affect the main A6 corridor looked at in this study.

Coal mining is not considered due to the age of the underlying solid strata.

Also present in the study area are a number of old (abandoned/filled) sand and gravel pits. These occur at various locations along the length of the route corridor. The sands and gravels that have been extracted are sourced from the glaciofluvial sheet deposits. Most of these lie adjacent to the present A6 carriageway and have been considered as possible areas of contaminated land.

Quarrying was not considered directly affecting the Claudy to Dungiven section of the scheme.

2.6 Hydrology, Hydrogeology and Drainage

There are a number of major watercourses along the existing A6 route corridor. These are namely the Foreglen River, Owenbeg River, Owenrigh River and the River Roe. There are also a number of smaller tributaries which flow into these watercourses.

The Foreglen River flows from east to west from the west of Foreglen towards Claudy where it connects to the River Faughan.

The Owenbeg River flows from south to north on the east side of Dernaflaw.

The Owenrigh River also flows from the south of Dungiven and connects to the River Roe which flows from the south to the north on the west side of Dungiven.

In terms of hydrogeology, the assessment of the study area is based on the 1:250,000 Hydrogeological Map of Northern Ireland (1994), which indicates aquifer potential in generalised terms, within a threefold division of geological formations:

- 1) Those in which intergranular flow in the saturated zone is dominant,
- 2) Those in which fissures control groundwater movement,
- 3) Less permeable formations including aquifers concealed at depth beneath covering layers.

In conjunction with this it is necessary to assess the Groundwater Vulnerability. The 1:250,000 Groundwater Vulnerability Map of Northern Ireland (1994) identifies the vulnerability of groundwater to contamination. To assess vulnerability, consideration is given to the distribution of aquifers, to the characteristics of the strata in the unsaturated zone, and to the physiochemical characteristics of the overlying soils. Geological divisions, based on lithological type and permeability characteristics, are combined with the soil groupings to produce seven groundwater vulnerability classes. Typically, groundwater is of high quality and requires little treatment prior to use. However, it may be vulnerable to contamination from both diffuse and point source pollutants, from both direct discharges into the groundwater and indirect discharges onto the land. Decontamination of groundwater is a difficult, prolonged, and expensive process and therefore it is important to prevent any pollution. Due to the scale (1:250,000) of the available mapping, the classification used is generalised.

From Claudy to the west of Foreglen rocks of Precambrian origin dominate generally mantled with a layer of glacial till. Around Dernaflaw bedrock is comprised of Lower Carboniferous clastic rocks again mantled by till to the south of the existing road. These strata are described as aquifers of limited potential or regions without significant groundwater. Around Dernaflaw to the north of the existing road, through the Owenbeg area to the west of Dungiven glacial outwash sands and gravels dominate and could potentially contain locally important aquifers. The area to the south and east of Dungiven is similarly also dominated by glacial outwash sands and gravels. To the south of the town, in the River Roe area, alluvial deposits dominate, in which there may be aquifers of limited or local potential.

Groundwater vulnerability is characterised within the route corridor largely by weak permeability, where groundwater is not present in large quantities. From the start of the corridor in the west to the western edge of Foreglen village the ground is described as category Type C, the village of Foreglen is described as Type B Low (BL), around Dernaflaw Type B High (BH), the Owenbeg River area is made up of Type B Low (BL), and from Owenbeg to Dungiven the area is dominated by Type B High (BH).

2.7 Public Utilities

Numerous services traverse the Dungiven area forming potential constraints upon any improvement scheme. These include water mains and buried electricity cables. There are also services (electricity, sewerage, cable, water etc) associated with all the properties within the corridor and these will need to be protected or diverted as appropriate when construction takes place.

2.7.1 *Northern Ireland Water*

Water mains are present on large sections of the existing A6 Foreglen Road and from its adjoining roads. In the residential areas surrounding the A6 there are large areas of underground pipes and sewers.

2.7.2 *British Telecom (BT)*

BT facilities are present along the length of the existing A6 Foreglen Road, these are predominately underground plant. Plant is also present on the majority of the existing A6 side roads and is mostly overhead. The residential areas surrounding the A6 are heavily populated with underground plant.

2.7.3 *Northern Ireland Electricity (NIE)*

NIE 275KV overhead cables cross the existing A6 Foreglen Road at the intersection with Ballyhanedin Road with the closest pylons being situated approximately 80m north of the existing junction and 380m south east of the junction.

NIE 33KV overhead cables are located to the north of Dungiven at Derryware.

NIE 11KV overhead cables are most abundant in populated areas around the existing A6. 11KV cables cross the existing A6 in the vicinity of junctions or where there are residential settlements north and south of the carriageway.

NIE MV overhead cables are found at residential locations.

2.7.4 *Street Lighting*

Roads Service apparatus (Street Lighting) is present on the A6 through Dungiven, the residential areas of Dernaflaw Road and Foreglen and the junction between the existing A6 and Baranailt Road.

2.8 **Major Alignment Constraints**

The route corridor identified under the stage 1 assessment contains several physical, manmade and environmental constraints that impact on the route which affect the alignment of the initial route alternatives. The major environmental constraints affecting all the route options are as follows:

- The River Roe valley and floodplain, including the River Roe candidate Special Area of Conservation (cSAC);
- Numerous individual properties: agricultural, residential and commercial;
- The existing local road network;
- The landscape AONB designation of the Sperrin Mountains;
- Three Scheduled Monuments;
- One monument in state care;
- Eleven Listed Buildings;
- One area of demesne land (Pellipar House)
- Numerous undesignated archaeological and industrial heritage sites;
- One Air Quality Management Area (AGMA) at Dungiven;
- Community Lands;
- Graveyards and Churches; and
- Numerous sensitive receptors.

In addition to the aforementioned constraints the avoidance of public utility services has also been considered.

Each of the constraints will be impacted upon in some way by the development. The impacts on the constraints will vary depending on route design. Generally, impacts on these constraints are avoided as far as possible. This is “mitigation by design”.

When assessing routes, a suite of other safety, economic, environmental and engineering constraints were considered. These include:

- Needs of local traffic and specific road users
- Requirements for access to property and adjacent development
- Location of statutory undertakers' (SUs') Plant
- Options for traffic management and safety during construction
- Integration and accessibility criteria

- Regional and local transport plans

3 Summary of Planning Factors

3.1 Regional Strategies

3.1.1 *Shaping Our Future – Regional Development Strategy for Northern Ireland 2025*

The Regional Development Strategy (RDS) takes account of European and national policies which would have an influence on the future development of Northern Ireland. The Strategic Planning (Northern Ireland) Order 1999 requires Northern Ireland Departments to have regard to the regional development strategy in exercising any functions in relation to development.

The RDS offers a strategic and long-term perspective on the future development of Northern Ireland up to the year 2025. It addresses a range of economic, social, environmental and community issues that are relevant to delivering, through the Northern Ireland Assembly, the objectives of achieving sustainable development and social cohesion in Northern Ireland. The document provides the strategic context for the formulation of subsequent development plans.

Central to this vision is “creating an upgraded and integrated transport system, built around the Regional Strategic Transport Network” and “enhancing the regional gateways with a focus on generating employment opportunities in and around the ports and airports.”

The strategy provides Strategic Planning Guidelines based on the themes examined in the document. Themes relevant to the present scheme are:

- Strengthening Regional Cohesion in a Global Context;
- Spatial Development Strategy for Northern Ireland;
- Londonderry: Regional City for the North West Rural Northern Ireland;
- Planning Strategy for Rural Northern Ireland;
- Supporting Economic Development;
- Developing a Regional Transportation System; and
- Caring for the Environment.

The Dungiven bypass and the route options within the Londonderry to Dungiven dualling scheme for the A6 are compliant with the aims of the RDS. The scheme recognises that the A6 (designated as a trunk road) is an important part of the top tier of the Region’s long distance routes connecting the cities and main towns to the major regional gateways and the Belfast Metropolitan Area. It is essential that this route conveys both social and economic traffic in an efficient and safe way. The proposed scheme will support the upgrading of the Regional Strategic Transport Network and contribute to the economic development of Londonderry and the North West.

The A6 scheme will contribute to the creation of a modern, sustainable and safe transport system for the region by enhancing accessibility. The route options in both sections will accommodate the growing volume of freight travelling along the existing A6 Road. The Red, Yellow and Brown routes and the grade separated junction at Priory Lane will improve accessibility to work and leisure areas for the Foreglen and Dernaflaw communities

3.1.2 *Shaping Our Future – Adjustments to the Regional Development Strategy for Northern Ireland 2025*

The overall objective of this review is to ensure that the RDS is fit for purpose and relevant to all Government Departments. Adjustments have been made to some of the Objectives, Strategic Planning Guidelines (SPGs), and the Supporting Actions of the SPGs. Those relevant to the present scheme are:

SPGs LNW1 – LNW 2 (Londonderry: Regional City for the North West Rural Northern Ireland)

It has been recognised that there is significant added value for the island of Ireland if both the National Spatial Strategy for Ireland and the Regional Development Strategy for the North can be implemented collaboratively,

“...there are strong cross border dimensions in both strategies and collaboration will offer material advantage in terms of economic competitiveness, sustainability and economies of scale” (page 27).

SPGs ECON 1-ECON 11 (Supporting Economic Development)

The Strategic Planning Guideline ECON 2 (2.1) has been adjusted to reflect the change in approach which seeks to; “facilitate sustainable economic growth and protect land from losses to other uses” (page 49).

Any improvements of the nature being examined, will improve road access to Londonderry.

3.1.3

Strategic Planning Guidelines ENV 1 – ENV 7

SPGs ENV 1- ENV 7 (Caring for the Environment)

A number of Strategic Planning Guidelines have been adjusted to reflect up to date policy and research on climate change and waste management and to meet obligations under the Habitats Regulations. The SPG ENV 1 (1.1, 1.2) has been adjusted to meet obligations under the Habitats Regulations and includes two new Supporting Actions (1.5 and 1.6). ENV 1.5 Protecting and Enhancing the Water Environment is relevant to the scheme and aims to,

“ensure that the quality of discharges is appropriate to meet the targets of the Water Framework Directive and other Directives; upgrade sewerage infrastructure and sewage treatment facilities to meet the required European quality standards; ensure that arrangement for treatment of sewage from all forms of new development meet the required European quality standards; develop a strategy to control diffuse pollution which will form part of a programme of measures developed under the European Water Framework Directive; and develop River Basin Management Plans for major regional and cross border water catchments in line with the European Water Framework Directive” (page 68) .

The A6 Londonderry to Dungiven dualling scheme is compliant with the amendments made by the RDS Shaping Our Future – Adjustments to the Regional Development Strategy for Northern Ireland 2025.

3.1.4

Regional Strategic Transport Network Transport Plan 2015

This plan is based on guidance set out in the Regional Development Strategy and the Regional Transportation Strategy. The Regional Strategic Transport Network Transport Plan (RSTN TP) of Northern Ireland comprises the complete rail network, five Key Transport Corridors, four Link Corridors, the Belfast Metropolitan Transport Corridors and the remainder of the trunk road network. The Plan consists of proposals for the maintenance, management and development of this transport network up to the end of 2015.

Objectives of the RSTN TP include to:

- Support Spatial Development in the RDS based on hubs, corridors and gateways; and
- Examine access to regional gateways and cross border links with an emphasis on improving connections from the five key transport and four link corridors.

The A6 Dungiven Bypass and the dualling of the A6 Randalstown to Castledawson are specifically mentioned as the Strategic Road Improvements and are thus now proposed in compliance with this policy.

3.2

Investment Strategy for Northern Ireland

The Investment Strategy 2008-2018 sets out a framework from which the Northern Ireland Executive will create a sustainable infrastructure. It identifies priority areas for investment and is intended to assist the Government and private sector partners in delivering the investment plan. The Executives programme for Government sets out three main objectives which guided the development of the investment strategy:

- Economic – investment in infrastructure to deliver quality and efficient public services;
- Societal – investment in infrastructure to promote regional balance and tackle areas of social disadvantage;
- Environmental – investment in infrastructure to protect and enhance the environment and natural resources.

The Investment Strategy concentrates on six main investment pillars:

- Networks
- Skills
- Health
- Social
- Environment
- Productive

In terms of transport, the strategy identifies that there has been under investment within the transport network. The strategy identifies the need to increase the size of motorway/dual carriageway network and upgrade selected link corridors and trunk roads. This in turn will reduce journey times and improve access to urban centres and inter-regional gateways. Accessibility will also be improved in the South-West and North-West to support more balanced development and reduce regional disparity. This will aid improvement in the road safety record with less numbers being killed or seriously injured on the roads.

The roads will be developed to enhance the public transport network and encourage a shift away from the car for journeys particularly in urban areas. This will include quality bus corridors on key arterial routes, investment in more accessible bus fleets and development of park-and-ride facilities to meet demand. Investment will also be concentrated on the development of a rapid transit system which underlines commitment to public transport services.

Environment investment is also proposed with the key goals including:

- A high quality water and waste water infrastructure for the region, capable of meeting EU requirements;
- A new approach to waste management that is compliant with EU regulations and uses more sustainable technologies;
- Sustainable flood risk management to meet the social, environmental and economic needs of the region.

The A6 scheme will contribute to the vision of the investment strategy in terms of increasing the size of and improving the motorway/dual carriageway network in Northern Ireland. The A6 scheme will contribute to the creation of a modern, sustainable and safe transport system for the region by enhancing accessibility. The route options in both sections will accommodate the growing volume of freight travelling along the existing A6 Road. This in turn will reduce journey times and accident rates. The bypass at Dungiven will provide better conditions for residents via the removal of through traffic.

3.3

Investment Delivery Plan for Roads

The Investment Strategy agreed by the Executive in January 2008 set out firm capital allocations at sub-pillar level for the 3 years to 2010-11 and indicative capital allocations for the 7 years thereafter. The Department has 4 sub-pillars under the Investment Strategy framework covering, Roads, Public Transport, Gateways, and Water and Wastewater. DRD has now developed Investment Delivery Plans (IDPs) to take forward the Department's infrastructure investment. The Roads document is available below.

The Investment Delivery Plans for Roads is a summary document which draws on all the documentation concerning major road works and details funding, costs, project programmes etc. It outlines what is achievable within the Investment Strategy for Northern Ireland (ISNI) period.

The Delivery Plan provides an overview of the Department's planned capital investment over the period 2008-18. As part of agreeing the ISNI 2008-18, Ministers undertook to publish Investment Delivery Plans covering their programmes. The framework to support the planning and delivery of the infrastructure programme over the period is consistent with the Programme for Government and investment will be taken forward under six investment 'pillars'.

The A6 is detailed in the Investment Delivery plan for Roads as a key project within the Strategic Road Improvement (SRI) programme.

4 Summary of Alternative Schemes

4.1 Introduction

This section of the Scheme Assessment report describes the possible routes being considered. To ease the assessment process, and to ensure that the most advantageous combinations of potential options are identified, the route has been split into two sections. The first section is between Claudy and to the east of Foreglen. This is identified as Section 1 – Claudy to Dungiven, there are three alternatives for this section namely the Red, Purple and Yellow options. The second section is from the east of Foreglen to the east of Dungiven. This is identified as Section 2 – Dungiven Bypass, there are five alternatives for this part of the route. Most of these options include some degree of online widening with deviations from the present A6 at various “pinch points” along the length of the scheme.

4.2 Geometric Standards and Cross Sections

Highway Link Design’ (DMRB, Volume 6, Section 1, TD 9/93) categorises the various standards of dual carriageway. All Purpose Dual Carriageways are designed to permit light vehicles to maintain the national Speed limit, and, subject to traffic conditions, permit light vehicles to overtake slower moving vehicles throughout. Five categories of dual carriageway are permitted, these are:

Category 5 – This is the lowest standard of dual carriageway, which normally represents an alternative to single carriageways. The vertical alignment should follow the topography closely with the horizontal phased to match. All junctions should be at-grade, with roundabouts at the more heavily trafficked intersections, although where economically/environmentally feasible, grade separated solutions should be provided.

Category 6 & 7c – In these categories, gaps in the central reserve for turning traffic are not permissible, and major and minor junctions shall not be used. Minor side roads shall be stopped up, provided with left in/left out connections or grade separated without connection. In Category 6, major intersection types, which may include roundabouts, will be determined by site conditions, traffic demand, and economic/environmental effect. In Category 7, however, the high costs of delays caused by roundabouts will normally result in more economic grade separated solutions. The combined vertical/horizontal alignments should follow the topography as much as possible, without purposely achieving a “motorway” type of flowing alignment.

Category 7a & 8 – These are the highest categories of All-Purpose road, where all intersections, both major and minor, shall be grade separated. A smooth flowing alignment is required for sustained high speeds.

Table 4 of TD 9/93 defines the carriageway cross section appropriate to each category of road.

Roads Service requires the proposed new dual carriageway to be a high standard dual carriageway with no breaks in the central median and grade separated interchanges to be provided at major junctions. Left-in left-out accesses may be given consideration where there is no reasonable alternative and in any event limited to one per kilometre. The maximum length of diversion to be undertaken by vehicles as a result of the scheme is 5 kilometres. With the above in mind, the new dual carriageway is deemed to be Category 6.

Each initial route option has been designed in accordance with the geometric standards defined in ‘Highway Link Design’ (DMRB, Volume 6, Section 1, TD9/93) using a design speed of 120kph.

The road cross-section used is based on that for a rural dual 2-lane carriageway, as defined in ‘Cross-Sections and Headrooms’ (DMRB, Volume 6, Section 1, TD 27/05) and comprises two 7.3m carriageways, two 1m hard strips at the side of each carriageway, a 2.5m central reserve, and 2.5m wide verges; a 5m maintenance strip is also provided beyond the top or bottom of cuttings and embankments.

4.3 Route Option Descriptions

4.3.1 Section 1 - Red Route

From the agreed starting point between the Derry to Claudy section (being dealt with by Scott Wilson) and the Claudy to Dungiven section (being dealt with in this report by AECOM) of the scheme, the proposed alignment lies offline and to the south of the existing A6 and heads parallel and eastwards towards Mulderg and the Gortilea Road. The route continues offline to the south of the existing A6 passing through a new grade separated junction at Ballyhanedin Road.

Leaving the new junction, the route continues off-line for a further 1km, and passes the Gortilea Water Pumping Station before diverging to the south towards the community of Foreglen.

On the approach to Foreglen, the route passes over the Foreglen River and through a disused sports pitch. The route then enters a deep cutting as it passes through the escarpment heading east to a new grade separated junction at Ovil.

4.3.2 Section 1 - Purple Route

From the agreed starting point between the Derry to Claudy section and the Claudy to Dungiven section of the scheme, the proposed alignment lies offline and to the south of the existing A6 and heads parallel and eastwards towards Mulderg and the Gortilea Road. The route continues offline to the south of the existing A6 passing through a new grade separated junction at Ballyhanedin Road.

Leaving the new junction, the route continues off-line, before going partially on line adjacent to the Gortilea Water Pumping Station. The route then diverges off-line to the south and returning on-line as the route passes through the community of Foreglen. A new grade separated junction is formed to the east of Foreglen, beyond the new junction, the route remains on-line to beyond Oville House.

4.3.3 Section 1 - Yellow Route

From the agreed starting point between the Derry to Claudy and the Claudy to Dungiven section of the scheme, the proposed alignment lies offline and to the south of the existing A6 and heads parallel and eastwards towards Mulderg and the Gortilea Road. The route continues offline towards a new grade separated junction at Ballyhanedin Road.

Leaving the junction, the route merges with the existing corridor and remains on-line through the community of Foreglen where a new grade separated junction is provided to the east of the village. The route then diverges offline to the south on the approach to Ovil and passes below Killunaught Road which is maintained for local access.

4.3.4 Section 2 – Red Route

From Ovil, the alignment runs parallel to the existing A6 and passes below Derrychrier Road as it approaches Dernaflaw.

The route then passes to the south of the community of Dernaflaw, across the candidate Special Area of Conservation (cSAC) comprising the Owenbeg River and associated woodland and through the centre of the GAA playing fields before meeting a new grade separated junction at the intersection with Feeney Road.

The route leaves the new Feeney Road junction and crosses the flood plain of the River Roe which, along with the woodland on the banks of the river, is a candidate Special Area of Conservation. As it heads to the south east, the route passes over Magheramore Road and Bleach Green before passing between the standing stone to the rear of St Patrick's RC church and the Dungiven Priory. Priory Lane which gives access to both the Standing Stone and the Dungiven Priory is crossed by the new route on embankment.

A further new grade separated interchange is constructed on the eastern edge of Dungiven immediately to the east of the Priory Lane and Chapel Road. Leaving this new grade separated interchange; the route continues south-eastwards and crosses to the north side of the existing A6 before tying in beyond the existing picnic area.

4.3.5 Section 2 – Purple Route

From Oville House, the route diverges to the south, crosses Derrychrier Road on an overbridge and the Owenbeg River and associated woodland that form a candidate Special Area of

Conservation before meeting another new grade separated interchange at the junction of Feeney Road.

Beyond the Feeney Road Junction, the route crosses over the Owenrigh River and associated woodlands that form another candidate Special Area of Conservation. Three side roads are then crossed on embankment, Magheramore Road, Teeavan Road, and an unnamed side road, before cutting into the escarpment that forms the south bank of the River Roe. Emerging from the cutting, the road lies on embankment as it crosses the River Roe, which is yet another candidate Special Area of Conservation, and heads towards the existing A6 on the outskirts of Dungiven.

A further grade separated junction is formed as the existing and new roads merge providing access to the east side of the town. Thereafter the route turns sharply to overlie the existing and merges beyond the existing picnic area.

4.3.6

Section 2 – Brown Route

From Ovil, the route remains on-line through Dernaflaw to the Feeney Road Junction where a new grade separated junction is provided to link the western end of Dungiven with the scheme.

Leaving the new Feeney Road junction, the route then continues off-line to the south east, and crosses the flood plain of the River Roe and through protected woodland on embankment. The River Roe and its associate woodland form part of a candidate Special Area of Conservation As it heads to the south west, the route passes over Magheramore Road and Bleach Green before passing between the standing stone to the rear of St. Patrick's RC church and the Dungiven Priory. Priory Lane which gives access to both the Standing Stone and the Dungiven Priory is crossed by the new route on embankment.

A further new grade separated interchange is constructed as the route merges with the existing A6 at the eastern edge of Dungiven at Priory Lane and Chapel Road.

Leaving the new grade separated interchange to the east of Priory Lane; the route continues eastwards and crosses to the north side of the existing A6 before tying in beyond the existing picnic area.

4.3.7

Section 2 - Blue Route

From Ovil, the route remains on-line to a point approximately 1km to the west of Dernaflaw.

A new grade separated junction is formed to the west of Dernaflaw where the route continues north east passing through the northern outskirts of the community. The route then crosses several minor side roads, through playing fields at the junction of the Ballygudden Road and the B192 Drumrane Road and across the candidate Special Area of Conservation formed by the River Roe and associated woodland. Immediately beyond the river, the route crosses into the domain of the historic Pellipar House as it heads to the north of Dungiven where a grade separated junction is provided at the B68 Ballyquin Road (to Limavady).

Leaving this junction on a sharp right hand bend, the route again crosses minor side roads including the B64 and the Derryware Burn as it heads south east towards the existing A6 and a new grade separated junction formed to the west of the existing picnic area. The route then continues south east and ties into the existing A6.

4.3.8

Section 2 - Cyan Route

From Oville House, the route diverges to the south, crosses Derrychrier Road on an over-bridge and the Owenbeg River and associated woodland that form a candidate Special Area of Conservation before meeting another new grade separated interchange at the junction of Feeney Road.

Beyond the new Feeney Road Junction, the route continues eastwards to the south of Dungiven, it crosses a couple of minor side roads before reaching the Owenrigh River which, together with its associated woodland, is a candidate Special Area of Conservation. The route then passes below Magheramore Road and crosses the River Roe which along with its associated woodland is a further candidate Special Area of Conservation. Passing over Bleach Green, the route then passes into cutting as it approaches Priory Lane which is maintained as an overbridge and links the Standing Stone to the rear of St. Patrick's RC Church and the Dungiven Priory. The dual carriageway terminates at a new roundabout to the east of Priory Lane and a single carriageway link is provided to the east end of Dungiven known as Chapel

Road and a further link connects to the existing A6 Glenshane Road as the route continues to the south east.

5 Summary of Public Consultation

5.1 Background

An exhibition presenting the possible routes for the dual carriageway between Claudy and Dungiven including the Dungiven bypass was held in the Sports Pavilion in Dungiven on the 20th and 21st May 2008. Another exhibition was held for the Claudy to Derry dualling scheme in the YMCA in Drumahoe on the 27th and 28th May 2008. These events were attended by staff from Roads Service and from both consultants, AECOM and Scott Wilson.

Landowners likely to be affected by the proposals, local and national politicians from the area and others considered likely to have an interest in the project were made aware of the exhibition by letter. The exhibition was widely publicised through advertisements in the local press and an extensive post office mail drop to relevant sectors in the BT47 post code area. Brochures outlining the scheme proposals were also deposited in local retail outlets.

5.2 Information Available

The brochures outlined both schemes and consisted of maps and general information about the delivery of the programme and at what stage the programme was currently positioned.

Summary information was included in order to update on the previous public exhibition regarding progress update, public participation, possible routes now being examined, and the selection process of the preferred route, possible completion dates and information on the procurement options.

For the Claudy to Dungiven dualling section, each route option was described, outlining where the upgraded road will join or deviate from the existing A6, the standard of the new road was also outlined as well as a description of where the new grade separated junctions will be in place. The map for this section outlined each route option scenario and highlighted the now enlarged study area from that of the previously stated study area.

For the Caw roundabout to Claudy dualling the information outlined was similar to that of the Claudy to Dungiven section but with the relevant content to that section.

5.3 Progress

Both events were well attended as recorded by the log book on the days and comments from the attendees were taken into consideration.

A separate report on summarising the public consultation exercise has been prepared.

6 Summary of Engineering Appraisal

6.1 Geometry

6.1.1

Link Proposals

All routes have been designed using the cross-section for a rural dual 2 lane carriageway, as defined in 'Cross-Sections and Headrooms' (DMRB, Volume 6, Section 1, TD 27/05) and comprise two 7.3m carriageways, two 1m hard strips at the side of each carriageway, a 2.5m central reserve and 2.5m verges.

The comparison of options based on the proposed geometric alignment has been assessed by considering compliance with the Design Manual for Roads and Bridges (DMRB) TD 9/93, the number of proposed at-grade junctions, and the overall length of the route.

All main line options have been designed to minimise the adoption of Relaxations or Departures and as stated previously, it is normal practice to adopt Relaxations and Departures from Standards where useful cost savings can be achieved, environmental impacts reduced, or operational advantages can be gained without significantly affecting safety.

Relaxations are a reduction of the Desirable Minimum Design Standards and can be incorporated into the design at the discretion of the engineer. Departures from Standards are generally required where there is a combination of Relaxations and Departures from Standards require the authorisation of Roads Service before being incorporated in the design.

At this stage in the process no assessment has been made of side roads and junctions and only a few Relaxations have been proposed on the main line. No assessment has been made of Stopping Sight Distance on the mainline as the location of road restraint systems has not been designed to date. Elsewhere, the options comply fully with the Desirable Minimum Standards specified in the DMRB.

The number of proposed left in left out junctions has an impact of driver stress and the potential for accidents, hence options with a smaller number of junctions are rated more highly.

The length of the route influences journey times, scheme cost and subsequent economic impact and the drivers' perception of the 'directness' of the route; bearing in mind it is considered that the shorter more direct an option the better. The overall quantities for the geometry review are listed in Tables 1 and 2 below:

Table 1 - Geometry Review – Section 1

ROUTE OPTION	NUMBER OF RELAXATIONS	NUMBER OF DEPARTURES	LENGTH OF OPTION (M)	NUMBER OF LEFT IN/ LEFT OUT JUNCTIONS
<i>Section 1 - Red</i>	0	0	8796	0
<i>Section 1 - Purple</i>	0	0	8847	6
<i>Section 1 - Yellow</i>	1	0	8904	5

Table 2 - Geometry Review – Section 2

ROUTE OPTION	NUMBER OF RELAXATIONS	NUMBER OF DEPARTURES	LENGTH OF OPTION (M)	NUMBER OF LEFT IN/ LEFT OUT JUNCTIONS
<i>Section 2 - Red</i>	3	1	6467	2
<i>Section 2 - Purple</i>	2	0	6561	0
<i>Section 2 - Brown</i>	4	1	6530	4
<i>Section 2 - Blue</i>	3	1	8139	0
<i>Section 2 - Cyan</i>	0	0	5150	0

6.1.2

Junction Proposals

Highway Link Design (DMRB, Volume 6, Section 1, TD 9/93) recommends that with a Category 6 dual carriageway that there shall be no minor at grade, all movement, junctions and that Major junctions along such a route shall either be at grade roundabouts or fully grade separated. New proposed junctions are provided at strategic points along the mainline to provide links to existing routes and reduce severance, maintain access to communities and villages along the route and also to provide u-turn facilities for properties losing the right turn facilities they currently enjoy.

The major side roads affected by the route options are as follows:-

- Ballyhanedin Road;
- Killunaught Road to the east of Foreglen;
- Feeny Road;
- Derrychrier Road;
- Ballyquin Road; and
- Chapel Road to the east of Dungiven

With the relatively low traffic manoeuvres associated with each of the side roads above, it was determined that compact grade separated junctions would be appropriate for all the junctions on all route options with one exception. The Cyan route terminates in a roundabout east of Dungiven. This results from engineering mitigation to reduce impact on the nearby Dungiven Priory, a state care site administrated by NIEA. The roundabout offers drivers an easily identifiable point of transition between the new dual carriageway and the existing road.

Layout of grade separated junctions (DMRB, Volume 6, Section 2, TD 40/94) sets out the design standards and methodology used for the design of a compact grade separated junction.

The use of compact grade separated junctions reduces the amount of land take and cost when compared to full grade separated junctions. One of the main benefits of grade separated junctions is the elimination of right turning vehicles which increases safety while maintaining the flow of traffic on the main line.

In Section 1 of the route, all three options require two grade separated junctions. The junctions are located at Ballyhanedin Road and to the east of Foreglen.

The location and type of the junction for each of the options in Section 2 are shown in Table 3 below.

Table 3 - Junction Locations – Section 2

JUNCTION LOCATION	SECTION 2 - RED	SECTION 2- PURPLE	SECTION 2 - BROWN	SECTION 2 - BLUE	SECTION 2- CYAN
<i>Feeny Road</i>	Grade Separated Junction	Grade Separated Junction	Grade Separated Junction	-	Grade Separated Junction
<i>Derrychrier Road</i>	-	-	-	Grade Separated Junction	-
<i>Ballyquin Road</i>	-	-	-	Grade Separated Junction	-
<i>East of Dungiven</i>	Grade Separated Junction	Grade Separated Junction	Grade Separated Junction	Grade Separated Junction	Roundabout
Total No. of Junctions	2	2	2	3	2

6.1.3

Severance and Side Road Proposals

Severance would normally be considered to be more of an environmental than engineering issue; however it is considered that minimising severance is a fundamental element of good engineering and has a significant impact on the ability to deliver the scheme.

Four criteria have been identified as a means of determining the potential for severance offered by the route options, these are the number of agricultural fields severed; the number of properties who, having an access severed, would face a diversion in excess of 5km to carry out a right turn manoeuvre; the number of roads stopped up, and the number of new means of access required to be provided to compensate for severance.

The number of agricultural fields severed simply reflects the likely extent of accommodation works and the potential for objections being received from members of the public on the publication of the Vesting Order. An Agricultural Impact Assessment was carried out by McIlmoyle Associates, in which a number of new means of access and potential over-bridges were identified to provide access to the severed agricultural fields. At this stage, no consideration has been taken of the impact of the severance or of the potential mitigation offered by adjacent fields being in the same ownership.

It is proposed to provide a new dual carriageway with no gaps in the central reserve and to minimise the number of left in left out accesses to those where no practicable alternative exists. A number of properties who currently enjoy a direct access to the A6 and are able to turn right through either a public or private access will no longer be able to do so and will require to be diverted through a new means of access. Although not applicable to Category 6 dual carriageways, the Roads Service Policy and Procedure Guide RSPPG 038 gives guidance on the length of diversions that are deemed to be acceptable, the RSPPG suggests that a diversion of less than 5km for minor accesses is acceptable. It is therefore concluded that diversions greater than 5km would be deemed to be unacceptable and the number of properties so affected have been recorded below.

The number of roads stopped up and the number of new means of access is a reflection of the changes to driving patterns that will be imposed on completion of the scheme and hence a measure of the disruption caused to road users.

Details of the severance considerations are summarised in Tables 4 and 5 below:

Table 4 - New Means of Access – Section 1

OPTION	NO. OF AGRICULTURAL FIELDS SEVERED	NO. OF PROPERTIES WITH >5KM DIVERSIONS	NO. OF ROADS STOPPED UP	NO OF NEW MEANS OF ACCESS	TOTAL LENGTH OF NEW MEANS OF ACCESS (M)
<i>Section 1 - Red</i>	96	0	5	5	2595
<i>Section 1 - Purple</i>	55	3	10	11	3968
<i>Section 1 - Yellow</i>	76	7	11	9	4008

Table 5 - New Means of Access – Section 2

OPTION	NO. OF AGRICULTURAL FIELDS SEVERED	NO. OF PROPERTIES WITH >5KM DIVERSIONS	NO. OF ROADS STOPPED UP	NO OF NEW MEANS OF ACCESS	TOTAL LENGTH OF NEW MEANS OF ACCESS (M)
<i>Section 2 - Red</i>	51	0	5	5	2085
<i>Section 2 - Purple</i>	86	4	3	3	1263
<i>Section 2 - Brown</i>	62	4	13	7	2636
<i>Section 2 Blue</i>	77	0	8	8	2768
<i>Section 2 Cyan</i>	60	0	1	2	443

6.2

Roadworks

The route alternatives comprise of on-line and off-line sections. The off-line sections of the routes will require full depth of pavement construction over the entire width, whereas the on-line sections may incorporate lengths of the existing single carriageway into the new pavement. The extent of the existing pavement that can be incorporated into the design for the online options will depend on the proposed road levels, the condition, strength and the residual life of the pavement. It has been assumed that the existing pavement for on-line sections would be suitable for use as the pavement foundation with the upper pavement layers overlaid on top to bring the pavement up to the full construction depth.

The route options vary from alternatives that are wholly off-line to alternatives where the majority of the route is on-line. All options in Section 2 include a bypass of Dernaflaw and Dungiven except the Brown route which only bypasses Dungiven.

The lengths of the mainline for each of the options and also the percentage of the routes on-line and off-line are shown in Tables 6 and 7 below.

Table 6 - Roadworks – Section 1

ROUTE OPTION	LENGTH OF OPTION (M)	% ONLINE	% OFFLINE
<i>Section 1 - Red</i>	8796	0	100
<i>Section 1 - Purple</i>	8847	44	56
<i>Section 1 - Yellow</i>	8904	55	45

Table 7 - Roadworks - Section 2

ROUTE OPTION	LENGTH OF OPTION (M)	% ONLINE	% OFFLINE
<i>Section 2 - Red</i>	6467	17	83
<i>Section 2 - Purple</i>	6561	9	91
<i>Section 2 - Brown</i>	6530	64	36
<i>Section 2 - Blue</i>	8139	14	86
<i>Section 2 - Cyan</i>	5150	6	94

6.3

Geotechnical Features

6.3.1

Bedrock

To the west of Dernaflaw the underlying strata generally comprise Schists and Phyllites of the Dart Formation (Dalradrian). Eastwards from Dernaflaw these strata are overlain unconformably by conglomerates, sandstones and mudstones of the Spincha Burn and the Barony Glen formations. There are few natural rock exposures in the area but some are found in river beds. The solid strata are often highly or completely weathered near rockhead.

Where encountered at or near ground level these strata generally offer a good founding stratum for embankments and structures.

Fracture orientations within the rock mass can influence the stability of slopes formed in these materials. Additionally schist and sedimentary rock demonstrate a pronounced fabric within the rock mass (foliation, bedding) which can also influence stability of rock slopes. Highly or completely weathered rock material should be considered and analysed as a soil.

It is expected that all excavated bedrock will be considered acceptable for re-use in bulk earthworks. Excavation of major rock cuttings is likely to require blasting; possibly using pre-split techniques to provide stable faces in the long term, rock cuts more than 8m high are likely to need intermediate stability berms, and soil/rock interface berms. Rock trap ditches should also be expected.

Where bedrock lies at pavement formation level then a CBR value greater than 15 can be expected.

6.3.2

Glacial Till

Generally a firm, stiff or very stiff deposit with varying proportions of clay, silt, sand, gravel and larger particles. The upper 1 to 2m is likely to be softened by weathering.

Below the weathered zone these deposits generally offer good foundation conditions for structures and embankments.

Cutting slopes are expected to be stable at grades of 1v:3h. However, local variations in the nature of the soil may require local treatments such as excavation and replacement. Slope drainage may be required locally to deal with seepages within the cutting face.

Where fresh glacial till is excavated (generally from depths greater than about 2m below ground level) the proportion of material which is acceptable for re-use in bulk earthworks is likely to be about 80%. Where glacial till is excavated from in the weathered zone of the deposit (from depths less than about 2m below ground level) the proportion of acceptable material falls to about 40%. Upper zones of weathered till may be unacceptable or class 4 landscape fill.

The moisture sensitivity of glacial till renders the acceptability proportion of excavated material to represent a significant geotechnical risk for this material.

Where fresh glacial till is present at formation CBR values are likely to range from above 2 to below 5; this will require the use of capping or thickened sub base. Weathered glacial till is likely to exhibit CBR values of less than 2.5%.

Glacial till is frost susceptible and is moisture susceptible to deterioration under adverse weather conditions and measured CBR values may diminish on exposure rain, hence conditions during constructions will need to be taken into account.

6.3.3 *Glaciofluvial Sheet Deposits*

The deposits are generally medium dense, dense or very dense deposits of silty sand and gravel mixtures, often with larger particles in the mass. They generally offer good founding conditions for embankments and structures.

Cutting slopes in these deposits are expected to be stable at slopes of 1v:3h although local variations in the nature of the soil such as layers of finer soils or organic material may require local treatment. These soils are likely to be relatively free-draining. Cuttings formed in such soils are likely to encounter groundwater and create a “drawdown” effect on the groundwater table in the vicinity of the cutting.

The proportion of these granular soils considered acceptable for re-use in bulk earthworks is likely to be about 80% but depends on the proportion of fines within the soil mass and this may vary from place to place or with depth.

Where present at formation level, these soils are likely to present a CBR value of between 5 and 15.

6.3.4 *Glaci-lacustrine Clays*

These are comprised of potentially soft clays, usually of limited extent and found in association with alluvium or peat deposits. Where soft they offer poor foundation conditions for structures and embankments.

Where present at formation level soft soils are likely to present a CBR value of less than 2.

6.3.5 *Alluvium*

These are recent deposits of waterborne clay, silt, sand and gravel deposited in narrow bands close to watercourses. The nature of the soil may vary laterally and with depth. Alluvium in the flood plain of the River Roe to the south of Dungiven appears to be predominantly granular (sand and/or gravel) in nature but may contain local pockets or layers of soft or organic deposits. Their proximity to watercourses indicates that groundwater levels are likely to lie at shallow depth below ground level and that occasional flooding of the deposits is to be expected.

Founding conditions for spread footings to structures are likely to be poor with a high water table and possibly variable foundation soils. A deep foundation solution (piles) needs to be employed where the alluvial deposits are thick. Ground treatments such as surcharge/rest periods, basal reinforcement, and vertical drainage may be required for approach embankments for stability and settlement.

6.3.6 *Peat*

Highly compressible saturated organic deposit generally found in large spreads to the north of the existing A6 Road or to the south of the route corridor(s) but occasionally encountered in places by some of the routes. These deposits have been shown to be between 2 and 5m thick in places and offer very poor founding conditions for structures and embankments.

Where structures positions are underlain by relatively thin layers of these deposits they may be excavated and replaced by engineered fill for spread footings or, where thick, a deep foundation solution may be more practical.

Depending on the thickness of the deposit various ground treatments may be required below embankments. Excavation of peat/soft below embankment and replacement with selected granular fill is expected to be the most viable solution. In particular, 1300m of Section 1 of the “Red route” crosses on embankment (and one structure) a spread of peat which has been shown to be up to 5m thick in places.

Dealing with peat/soft deposits will be associated with an increase in permanent land-take or in land made available for construction.

Excavated peat will be deemed as unacceptable.

These soils are unsuitable as a formation for roads or earthworks and should be excavated and replaced by acceptable material or be subject to other treatments or construction techniques

Geology, Geomorphology and Ground Conditions

The following section describes the geology and soils underlying the various route options. Each route will be described in two sections:

1. Claudy to Dernaflaw (Routes Purple, Red and Yellow); and
2. Dernaflaw to Dungiven (Routes Blue, Brown, Cyan, Purple and Red)

In section 1 the routes commence by following similar alignments lying on or close to the line of the existing A6 road. After about 3000m or so two of the alignments (Yellow and Red) diverge southwards from the existing road and cross open country to Dernaflaw while the other (Purple) continues on line.

6.3.7

Section 1

Scheme Chainage commences in the west near Claudy and increases eastward. Section 1 terminates just to the west of Dernaflaw (at about easting 264640).

Section 1 - Red Route

This route lies adjacent and runs parallel to the existing A6 Road until at ch3000 it begins to diverge southwards crossing open country to Dernaflaw at about ch8750.

The underlying deposits generally comprise “Boulder Clay” but alluvium and peat are encountered locally.

For most of the length of the section bedrock comprises Phyllites and Schists of the Dart Formation (Dalradrian). At the easterly end of the section (ch7950 to 8750) the route is underlain by conglomerates, sandstones, siltstones and mudstones of the Spincha Burn and the Barony Glen Formations (Carboniferous).

Between ch2000 and 2700 a narrow strip of alluvium associated with a watercourse lies adjacent to or beneath the toe of proposed embankments. The thickness of this deposit is not known but embankments proposed in this area are likely to require some excavation, disposal and replacement of peat or soft clays, slackened side-slopes and/or additional land-take during construction.

Between ch5100 and 6400 peat and soft clays lie at the surface. This has been shown to be thin (<1m thick) in some areas but also to reach depths of 3m to 5m below ground level (bgl) in others. Embankments proposed in this area are likely to require ground treatment such as excavation, disposal and replacement of peat, slackened side-slopes, surcharging/ rest periods, additional land-take during construction or combinations thereof.

Made Ground to football pitch elevated slightly above general ground level between ch5400 and ch5550.

Bedrock is not exposed at the surface but between ch7100 and 7500 is expected to underlie the surface peat at shallow depths of 1m below ground level. Cuttings in this area have the potential for steepened side slopes with resulting reduction in land-take required for the works.

Section 1 - Purple Route

This route starts adjacent to and runs parallel to the existing A6 Road until at ch3500 it begins to diverge southwards crossing open country before meeting the existing road again at ch5600 and thereafter following the line of the road to ch8750 just west of Dernaflaw.

The underlying deposits generally comprise “Boulder Clay” but alluvium is encountered locally and at the end of the section the route is underlain by a “tongue” of Glaciofluvial sands and gravels.

For most of the length of the section bedrock comprises Phyllites and Schists of the Dart Formation (Dalradrian). At the easterly end of the section (ch8050 to 8850) the route is underlain by conglomerates, sandstones, siltstones and mudstones of the Spincha Burn and the Barony Glen Formations (Carboniferous).

Between ch2000 and 2700 a narrow strip of alluvium associated with a watercourse lies adjacent to or beneath the toe of proposed embankments. The thickness of this deposit is not

known but embankments proposed in this area are likely to require some excavation, disposal and replacement of peat, slackened side-slopes and/or additional land-take during construction.

Between ch3500 and 5100 cuttings may encounter bedrock (Schist) weathered near rockhead.

From Ch5600 to the end of the section (at ch8750) the route overlies the existing A6 Road. Existing earthworks are slackened to 1v:3h requiring widening of existing embankments and re-grading of cuttings.

Between ch7600 and 8750 the route is underlain by the existing A6 road on Glaciofluvial sands and gravels.

Section 1 - Yellow Route

This route lies adjacent and runs parallel to the existing A6 Road until at ch3000 the alignment merges with that of the existing A6 Road and lies superimposed until ch7700 where it diverges southwards crossing open country to Dernaflaw at about ch8890.

The underlying deposits generally comprise “Boulder Clay” but alluvium and peat are encountered locally.

For most of the length of the section bedrock comprises Phyllites and Schists of the Dart Formation (Dalradrian). At the easterly end of the section (ch8050 to 8750) the route is underlain by conglomerates, sandstones, siltstones and mudstones of the Spincha Burn and the Barony Glen Formations (Carboniferous).

Between ch2000 and 2700 a narrow strip of alluvium associated with a watercourse lies adjacent to or beneath the toe of proposed embankments. The thickness of this deposit is not known but embankments proposed in this area are likely to require some excavation, disposal and replacement of peat, slackened side-slopes and/or additional land-take during construction.

From about ch3000 onwards the new alignment follows the existing route. Side slopes of 1:3 require existing embankments to be widened and cuttings re-graded. Local differences in vertical alignment require new embankments or cuttings.

At about ch7300 the alignment passes close to an area of “Made Ground” within a fluvio-glacial deposit and between ch7600 and ch7700 the route is underlain by fluvio-glacial sands and gravels.

6.3.8

Section 2

Scheme Chainage commences just west of Dernaflaw (about easting 264640) and increases eastward to the tie-in with the existing road southeast of Dungiven.

Section 2 - Red Route

The route starts just west of Dernaflaw crosses open country to the south of the existing A6 Road crossing the Owenbeg River and the River Roe before reaching the existing A6 road east of Dungiven and following this line to the grade tie-in.

The road is initially (in the west) underlain by Glacial Till (Boulder Clay) but in the main crosses wide spreads of Fluvio-glacial deposits. Narrow bands of alluvium are encountered associated with watercourses and the alluvial deposits of the flood plan of the River Roe are crossed on embankment for a distance of about 850m.

Underlying solid strata generally comprise the sandstones, siltstones and mudstones of the Barony Glen Formation (Carboniferous) but from ch4800 to the end at ch6450 the route is underlain by Phyllites and schists of the Dart Formation (Dalradrian).

Between ch3150 and ch3500 the route crosses two areas of made ground, probably in filled gravel pits.

At ch5900 the road sits adjacent to a steep slope falling westwards to the river. Earthworks for 1:3 side slopes may require additional retention and or benching measures.

Section 2 - Purple Route

At the start of the route just west of Dernaflaw it lies superimposed on the existing A6 Road but immediately starts to swing south away from the road crossing open country. It crosses the Owenbeg River and a minor stream before crossing an area of historical landslip in the western bank of the River Roe then crosses the river itself. From there it rises to meet the existing A6 Road east of Dungiven at runs on-line for about 350m to the grade tie-in.

Initially underlain by Glacial Till (Boulder Clay) the route crosses a wide spread of Fluvio-glacial deposits before again being underlain by Glacial Till. After crossing the River Roe the route is again underlain by granular fluvio-glacial deposits. Narrow strips of alluvium are encountered adjacent to watercourses.

Strata of the Barony Glen Formation comprising sandstones, siltstones and mudstones underlie the major part of the route but from ch4550 these are replaced by Phyllites and schists of the Dart Formation.

At ch4400 a retaining wall is proposed to support the embankments adjacent to the River Roe. Bedrock is exposed in the riverbed.

Section 2 - Brown Route

Initially the Brown Route lies atop the existing A6 Road but at about ch3200 it swings away to the southeast to pass to the south of Dungiven crossing the flood plain of the River Roe on embankment. Continuing south-eastwards on embankment the route rejoins the existing A6 at about ch5400 and following this liner to the end of the section at ch6550.

The route is generally underlain by granular Fluvio-glacial deposits but also crosses a narrow band of alluvium at the Owenbeg River and a more extensive area of alluvial deposits in the flood plain of the River Roe for about 1km.

At about ch1200 the route earthworks may encroach onto the site of a former Flax Mill.

At about ch1850 and 3350 the route runs adjacent to or through made ground in old gravel pits.

Between ch4620 and 4680 the route lies adjacent to a steep slope falling westwards towards the River Roe. Earthworks for 1:3 side slopes encroach down slope and may require additional retention/ benching.

Section 2 - Blue Route

Initially the Blue Route lies atop the existing A6 Road but soon swings away to the northeast to cross open country mainly in cutting but with stretches near grade or low embankment until it reaches the River Roe at about ch4300. From here the alignment swings to the southeast around the outskirts of the Dungiven and crosses open country generally on embankment or at-grade in places towards the tie-in with the existing A6 to the south east of the town.

The underlying deposits generally comprise "Boulder Clay" and Fluvio-glacial deposits but alluvium is encountered locally close to watercourses and peat may be encountered over a short distance near ch2800.

For most of the length of the section bedrock comprises conglomerates, sandstones, siltstones and mudstones of the Spincha Burn and the Barony Glen Formations (Carboniferous). At the eastern end of the section (ch7100 to 8150) the route is underlain by Phyllites and schists of the Dart Formation (Dalradian).

Between ch1300 and 1500 the route passes over an area of Made Ground associated with old gravel workings.

Between ch2800 and 2875 the route crosses a narrow tongue of peat extending from a more extensive area of peat to the north.

The route crosses a band of alluvium associated with the River Roe at about between ch4075 and 4300.

Between ch4680 and 5025 the route sits over a watercourse and localised pockets of alluvium. Bedrock is exposed in parts of the stream bed.

Section 2 - Cyan Route

The route commences in open country south of the existing A6 road and continues in open country passing to the south of Dungiven. It crosses the Owenbeg River, a minor stream and the River Roe before reaching the existing A6 road east of Dungiven and where it is proposed to tie-in at grade.

At the start of the route in the west the underlying deposits comprise Glacial Till (Boulder Clay) but after about 2000m these are replaced in the main by granular Fluvio-glacial deposits. Alluvium is encountered in narrow strips adjacent to watercourses. An area of Peat lies just to

the north of the route at about ch3400. Bedrock is exposed in the riverbed at the crossing point of the River Roe.

The major part of the route is underlain by bedrock of conglomerates, sandstones, siltstones and mudstones of the Barony Glen Formation (Carboniferous) but from about ch4650 to the end at ch5200 it is underlain by Phyllites and schists of the Dart Formation (Dalradian).

6.3.9

Topography

Section 1

To the north of the existing A6 route the terrain is hilly with The Highland Hill and the Ballyholly Hill present from Claudy to the west of Foreglen. The Foreglen River flows from the west of the settlement of Foreglen on the south side of the existing A6 route. The topography south of the existing A6 is generally flatter than to the north.

Immediately to the south of Foreglen there is the Ovil Hill and other notable features in the area include the playing fields which have an area of woodland adjacent and standing stone.

The main land use both to the north and south of the existing A6 is agricultural. There are a small number of dwellings along the route other than the settlement of Foreglen and these are mainly adjacent to the existing A6 and within a kilometre either side of Foreglen.

Section 2

From Ovil Hill the existing A6 route falls towards the settlement of Dernaflaw. From Dernaflaw the topography is relatively flat over approximately 2 kilometres to Dungiven, the main town in the area. The existing A6 route crosses the Owenbeg River to the east of Dernaflaw and the River Roe to the west of Dungiven, both are designated candidate Special Area of Conservation (CSAC).

The main land use both to the north and south of the existing A6 is agricultural. There are a small number of dwellings along the existing route between Dernaflaw and Dungiven.

6.4

Hydrology, Hydrogeology and Drainage

It is necessary to establish if drainage outfalls can be achieved from the lowest points in the carriageway profile together with points where drainage networks would be severed by a structure. Route options that require the use of pumping to drain surface water would be rejected due to the long term maintenance costs.

There will be an increase in surface water runoff wherever the proposed bypass is developed on existing permeable green field, as the water will not be able to infiltrate into the ground. This can, and should be mitigated by the implementation of Sustainable Drainage Systems (SuDS).

A brief assessment has been made of the likely drainage networks on the mainline taking into account the vertical gradient of each of the options, the location of existing watercourses and proposed and existing structures. A review of the findings is shown in Tables 8 and 9 below.

Table 8 - Drainage Review Section 1

ROUTE OPTION	NUMBER OF DRAINAGE OUTFALLS	MAXIMUM DISTANCE FROM CARRIAGEWAY OUTLET TO WATERCOURSE (M)	MINIMUM CARRIAGEWAY GRADIENT %	ACCEPTABLE?
<i>Section 1 - Red</i>	9	45	0.4%	YES
<i>Section 1 - Purple</i>	10	170	0.4%	YES
<i>Section 1 - Yellow</i>	10	170	0.4%	YES

Table 9 - Drainage Review Section 2

ROUTE OPTION	NUMBER OF DRAINAGE OUTFALLS	MAXIMUM DISTANCE FROM CARRIAGEWAY OUTLET TO WATERCOURSE (M)	MINIMUM CARRIAGEWAY GRADIENT %	ACCEPTABLE?
<i>Section 2 - Red</i>	8	158	0.5%	YES
<i>Section 2 - Purple</i>	6	178	0.4%	YES
<i>Section 2 - Brown</i>	8	174	0.7%	YES
<i>Section 2 - Blue</i>	8	182	0.8%	YES
<i>Section 2 - Cyan</i>	6	84	0.4%	YES

The minimum carriageway gradients shown in the Tables 8 and 9 above are relatively flat. Generally though, these carriageway drainage networks would be over fairly short lengths and are therefore acceptable.

The vertical alignment for the purple and Cyan Routes in Section 2 creates a low point in the middle of the cutting at approximately chainage 2800 for both routes meaning that there is not an obvious outfall location. This has the effect that the drainage network would have to go against the gradient to achieve an outfall. This would require substantial excavation with the depth to invert of approximately 4 metres and 6 metres for the Purple and Cyan routes below the proposed carriageway levels.

The Blue route in Section 2 may require the Derryware Burn to be realigned. The side slope from Chainage 4700 – 5000 encroaches on and completely covers the Derryware Burn. Further consideration of this occurrence would be required.

One outfall location in the Blue route at Ch. 4200 is near the end of a cutting. There would be little opportunity for attenuation or treatment of the runoff at this location.

A Flood Risk Assessment was been carried out at the request of Rivers Agency to determine the impact on the flood plain of the rivers crossed by the various route options. The report concluded that all of the routes could be accommodated with suitable mitigation and a series of mitigation measures and further work were recommended for implementation as the project developed.

The estimated cost of implementing the mitigation measures has been included in the cost estimate prepared for each option.

6.5

Earthworks

The route options have been developed taking into account information from historical mapping and aerial photography and, where possible, areas of poor ground have been avoided. However, due to geometric and other constraints, it is not always possible to avoid less favourable ground conditions completely. A preliminary ground investigation was commissioned to supplement the available historical information and to enable an assessment of the potential re-use of earthwork materials within the site boundary.

The earthwork quantities for each of the route options were extracted from the design models. An assessment of the preliminary ground investigation was carried out to derive the percentage of cut material acceptable for reuse on site as either earthworks fill or landscaping fill. The percentage of cut material unacceptable or surplus was also calculated.

All the routes pass through varying types of soils. Glacial Till and Glaciofluvial Sheet deposits are present over a considerable area in both Section 1 and Section 2 study areas. Lacustine deposits are found near the rivers and areas of peat can be found to the south of Foreglen and to the west of the Owenrigh River. These soils have varying potential for use as fill. Glacial Till and Glaciofluvial Sheet deposits have the potential for 80% to be reused on site as earthworks fill. Lacustine deposits and peat should not be used as earthworks fill.

The earthworks quantities and percentage of acceptable and unacceptable material for each route option are shown in Tables 10 and 11 below.

Table 10 - Earthworks - Section 1

ROUTE OPTION	BULK CUT VOLUME (M ³)	BULK FILL VOLUME (M ³)	% CUT VOLUME ACCEPTABLE FOR REUSED ON SITE AS EARTHWORKS FILL	% CUT VOLUME TO BE REMOVED FROM SITE	% CUT VOLUME ACCEPTABLE FOR REUSED ON SITE AS LANDSCAPING FILL	IMPORT VOLUME REQUIRED (M ³)
<i>Section 1 - Red</i>	1,359,235	862,673	70	23	7	86,208
<i>Section 1 - Purple</i>	322,689	504,368	75	0	25	262,351
<i>Section 1 - Yellow</i>	317,410	426,034	65	0	35	219,718

Table 11 - Earthworks - Section 2

ROUTE OPTION	BULK CUT VOLUME (M ³)	BULK FILL VOLUME (M ³)	% CUT VOLUME ACCEPTABLE FOR REUSED ON SITE AS EARTHWORKS FILL	% CUT VOLUME TO BE REMOVED FROM SITE	% CUT VOLUME ACCEPTABLE FOR REUSED ON SITE AS LANDSCAPING FILL	IMPORT VOLUME REQUIRED (M ³)
<i>Section 2 - Red</i>	499,163	1,014,041	80	0	20	614,711
<i>Section 2 - Purple</i>	798,709	1,289,309	15	0	85	1,169,503
<i>Section 2 - Brown</i>	76,632	942,445	20	0	80	927,119
<i>Section 2 - Blue</i>	570,917	881,705	80	0	20	424,971
<i>Section 2 - Cyan</i>	546,239	567,619	70	13	17	185,252

6.6 Structures

For simplicity, bridges have been classified as being either minor or major, minor being spans up to and including 5 metres.

6.6.1

Section 1 - Red Route

There are a total of 13No bridges required along the Red Route within Section 1. The bridges can be grouped into 2No major multi span over-bridges, 3No major single span under-bridges and 8No minor single span under-bridges.

There is an existing bridge at Muldonagh 1 that is partially on the line of the proposed red route. This bridge was inspected in 2006 and recorded as being in good condition with no significant defects. However, it has not been assessed since 1992, at which time it was considered to be capable of carrying the 40 tonne Assessment Live Loading. Subject to an up to date assessment, it may be possible to retain this bridge and to extend it southwards under the new proposed red route.

The estimated total cost for the construction of the bridges along the Red route is approximately £6,248,000.

There is an existing bridge at Gortilea that will necessitate the construction of a new bridge on the adjacent proposed Red Route. At this location, the proposed Red route will lie immediately to the south of the existing road and should not affect the flow of traffic on the existing road during the construction of the new bridge.

It is anticipated that the location of the proposed Red route adjacent to the existing bridge at Muldonagh 1 will be sufficiently clear of the existing road to allow traffic to continue to flow unimpeded during the construction of the new bridge.

It is anticipated that traffic diversions will be required at a total of 6 bridge locations.

6.6.2

Section 1 - Purple Route

There are a total of 14No bridges required along this section of the purple route. The bridges can be grouped into 1No major multi span over-bridge, 3No major single span under-bridges and 10No minor single span under-bridges.

There are 3No existing bridges at Muldonagh 1, Ballymoney and Killunaght that are wholly on the line of the proposed Purple Route. The bridges were inspected in 2006, 1991 and 1993 respectively and all recorded as being in good condition with no significant defects. However, there are no assessment reports available for Muldonagh 1. Ballymoney and Killunaght have not been assessed since 1992 and 1993 respectively, at which time they were considered to be capable of carrying the 40 tonne Assessment Live Loading. Subject to an up to date assessment, it may be possible to retain these bridges and to extend them under the new proposed Purple route.

The estimated total cost for the construction of the bridges along the Purple route is approximately £4,411,000.

There is an existing bridge at Gortilea that will necessitate the construction of a new bridge on the adjacent proposed Purple route. At this location, the proposed Purple route will lie immediately to the south of the existing road and should not affect the flow of traffic on the existing road during the construction of the new bridge.

Traffic diversions will be necessary to allow the construction of the extensions to the existing bridges at Muldonagh 1, Ballymoney and Killunaght. It is anticipated that the diversions will be part of the overall diversion since significant lengths of the proposed Purple route at these locations lie along the line of the existing road.

It is anticipated that traffic diversions will be required at a total of 6 bridge locations.

6.6.3

Section 1 - Yellow Route

There are a total of 14No bridges required along the Yellow route. The bridges can be grouped into 1No major multi span over-bridge, 3No major single span under-bridges and 10No minor single span under-bridges.

There are 3No existing bridges at Muldonagh 1, Muldonagh 2 and Ballymoney 1 that are wholly on the line of the proposed Yellow Route. The bridges were inspected in 2006, 1994 and 1991 respectively and the latter two assessed in 1994 and 1992, at which time, all bridges were found to be capable of carrying the 40 tonne Assessment Live Loading. Subject to assessment, it may be possible to retain these bridges and to extend them at both ends under the new proposed Yellow route.

There is a further existing bridge at Killunaght that is partially on the line of the proposed Yellow route and which was assessed in 1993 to be capable of carrying the 40 tonne Assessment Live Loading. Again, subject to an up to date assessment, it may be possible to retain this bridge and to extend it north eastwards under the new proposed connection of Altmover Road to the Yellow route.

The estimated total cost for the construction of the bridges along the Yellow route is approximately £4,537,000.

There is an existing bridge at Gortilea that will necessitate the construction of a new bridge on the adjacent proposed Yellow Route. At this location, the proposed Yellow route will lie

immediately to the south of the existing road and should not affect the flow of traffic on the existing road during the construction of the new bridge.

Traffic diversions will be necessary to allow the construction of the extensions to the existing bridges at Muldonagh 1, Muldonagh 2 and Ballymoney 1. It is anticipated that these diversions will be part of the overall diversion since most of the proposed Yellow route at this location lies along the line of the existing road.

It should be possible to extend the length of the existing bridge at Killunaght whilst maintaining traffic flow on the existing road.

It is anticipated that traffic diversions will be required at a total of 6 bridge locations.

6.6.4

Section 2 - Red Route

There are a total of 8No bridges required along the Red route of Section 2. The bridges can be grouped into 1No major multi span over-bridge, 1No major multi span under-bridge and 6No major single span under-bridges.

The estimated total cost for the construction of the bridges along the Red route is approximately £9,008,000.

It should be possible to construct the bridges at Major Interchange No 4 without the need for traffic diversions since the proposed Red route is generally off line from the existing road.

It is anticipated that traffic diversions will be required at a total of 4 bridge locations.

6.6.5

Section 2 - Purple Route

There are a total of 11No bridges and 1No retaining wall required along this section of the Purple route. The bridges can be grouped into 1No major multi span over-bridge, 1No major multi span under-bridge, 1No major single span over-bridge and 8No major single span under-bridges.

The estimated total cost for the construction of the bridges and retaining wall along the Purple route is approximately £15,198,000.

However, savings could be achieved by diverting the Owenbeg tributary at chainage 1820 to flow into the Owenbeg River at chainage 1920 thereby deleting the requirement for a bridge at chainage 1820. Further savings could be achieved by diverting Teeavan Road at chainage 4110 to join Magheramore Road at chainage 3870 thereby deleting the requirement for a bridge at chainage 4110. Also, the proposed bridge at 2010 could be replaced by a proposed retaining wall similar to the Cyan route.

By taking these suggestions into consideration, the revised estimated construction cost would be approximately £12,575,000.

It is anticipated that traffic diversions will be required at a total of 6 bridge locations.

6.6.6

Section 2 - Brown Route

There are a total of 8No bridges required along this section of the Brown route. The bridges can be grouped into 1No major multi span under-bridge, 1No major multi span over-bridge and 6No major single span under-bridges.

There is 1No existing bridge at Owenbeg 1 that is wholly on the line of the proposed Brown route. This bridge was inspected in 2005 and recorded as being in good condition with no significant defects. However, it has not been assessed since 1991, at which time it was considered to be capable of carrying the 40 tonne Assessment Live Loading. Subject to an up to date assessment, it may be possible to retain this bridge and to extend it at both ends under the new proposed Brown route.

The estimated total cost for the construction of the bridges along the Brown route is approximately £8,747,000.

A traffic diversion will be necessary to allow the construction of the extensions to the existing bridge at Owenbeg 1. It is anticipated that the diversion will be part of the overall diversion since a significant length of the proposed Brown Route at this location lies along the line of the existing road.

It is anticipated that traffic diversions will be required at a total of 4 bridge locations.

6.6.7

Section 2 - Blue Route

There are a total of 14No bridges required along this section of the Blue route. The bridges can be grouped into 4No major multi span over-bridges, 1No major multi span under-bridge, 7No major single span under-bridges and 2No minor single span under-bridges.

The estimated total cost for the construction of the bridges along the Blue route is approximately £12,651,000.

However, savings could be achieved by diverting Ballyguddin Road at chainage 3800 to join Drumane Road at chainage 3945 and thereby deleting the bridge at chainage 3800.

By taking this suggestion into consideration, the revised estimated construction cost would be approximately £10,935,000.

It is anticipated that traffic diversions will be required at a total of 10 bridge locations.

6.6.8

Section 2 - Cyan Route

There are a total of 10No bridges and 1No retaining wall required along this section of the Cyan route. The bridges can be grouped into 2No major multi span over-bridges, 1No major multi span under-bridge and 7No major single span under-bridges.

The estimated total cost for the construction of the bridges and retaining wall along the Cyan route is approximately £11,625,000.

It is anticipated that traffic diversions will be required at a total of 6 bridge locations.

6.6.9

Summary

Table 12 - Structures Review - Section 1

ROUTE OPTION	MAJOR STRUCTURES	MINOR STRUCTURES	COST	REVISED COST
<i>Section 1 - Red</i>	5	8	£6,248,000	-
<i>Section 1 - Purple</i>	4	10	£4,411,000	-
<i>Section 1 - Yellow</i>	4	10	£4,537,000	-

Table 13 - Structures Review - Section 2

ROUTE OPTION	MAJOR STRUCTURES	MINOR STRUCTURES	COST	REVISED COST
<i>Section 2 - Red</i>	8	0	£9,008,000	-
<i>Section 2 -Purple</i>	11	1	£15,198,000	£12,575,000
<i>Section 2- Brown</i>	8	0	£8,747,000	-
<i>Section 2- Blue</i>	12	2	£12,651,000	£10,935,000
<i>Section 2- Cyan</i>	10	1	£11,625,000	-

6.7

Public Utilities

The services criterion is a measure of the impact each of the route options will have on services owned and operated by the public utility companies.

C2 Preliminary enquiries have been made in December 2007 under the Street Works (Northern Ireland) Order 1995. The information provided has been used to assess any impact that their apparatus may have upon each of the possible route corridors being considered. Outstanding information is required to fully assess the Blue option to the north of Dungiven but correspondence and plans have been received from the following Utility Companies:

- Firmus Energy
- Phoenix Natural Gas
- BGE Northern Ireland

- Roads Service (Lighting)
- Northern Ireland Electricity
- BT Northern Ireland, and
- Northern Ireland Water

No response has been received from the following Utility Companies:

- NTL Communications (Virgin); and
- Cable and Wireless

These are being pursued.

6.7.1

Firmus Energy

Preliminary enquiries have indicated that Firmus Energy have no distribution plant or equipment in the study area and Firmus has not indicated any immediate intention to install plant.

6.7.2

Phoenix Natural Gas

Preliminary enquiries have indicated that Phoenix Natural Gas have no distribution plant or equipment in the study area.

6.7.3

BGE Northern Ireland

Preliminary enquiries have indicated that BGE Northern Ireland have no transmission pipeline or apparatus in the study area.

6.7.4

Road Service (Street Lighting)

Roads Service (Street Lighting) has provided details of plant within the study area. This plant is mainly located within the built up areas in the communities and villages and on side roads along the route.

6.7.5

Northern Ireland Electricity

As the diversion of low voltage distribution lines are unlikely to add significantly to the cost of the scheme, only the high voltage transmission network has been studied at depth at this stage. The tables below summarises the location of conflicts between the high voltage network and each of the route options being considered. All crossings recorded occur on the 275kv and 11kv local distribution lines. No 110kv or 33kv lines are shown on the provided information for any of the routes.

6.7.6

BT Northern Ireland

The following tables below summarises the location of conflict between BT underground and overhead cables and each of the route options: In the identification below, crossings have been numbered when the services run perpendicular to the mainline and conflict points have been identified when the services run parallel to the mainline.

6.7.7

Northern Ireland Water

Northern Ireland Water has provided details of plant within the study area. The following table below summarises the location of conflict between Northern Ireland Water apparatus and each of the route options: In the identification below crossings have been numbered when the services run perpendicular to the mainline and conflict points have been identified when the services run parallel to the mainline.

6.7.8

Conclusions

All routes in Section 1 between Claudy and the Ballyhanedin Road junction are off-line and follow the same alignment and therefore have little impact on public utilities.

Between Ballyhanedin Road junction and Foreglen the majority of public utilities are adjacent to the existing A6 carriageway. This means that the online options are more likely to have an impact on services and incur greater costs for diverting these public utilities. The Yellow route is fully online through this section and the Purple route is online through the town of Foreglen.

Between Foreglen and the end of Section near Ovil, the majority of public utilities are along the existing A6 carriageway. There is also a high concentration of public utilities along Killunaught Road which run to the south of the existing mainline.

In Section 2, from Ovil to the east of Dungiven the public utilities are again located along the existing A6 carriageway through the settlement of Dernaflaw and the side roads, Derrychrier

Road, Feeny Road and Magheramore Road. The routes that would affect the public utilities over this section of proposed routes would be the brown and red options. There is also a high concentration of NIE, BT and NI Water apparatus to the south of Dernaflaw on the line of the red, purple and cyan options.

6.8

Land and Property Take

The property take criterion assesses the impact each of the route options would have on existing residential and commercial properties and approved planning applications. It should be noted that these figures are based on current mapping, which was produced in 1997.

The Quantities as shown in 14 and 15 below are based on the total number of properties and approved applications falling within a corridor wide enough to accommodate a D2AP carriageway cross-section plus side slopes and a 5m maintenance strip. Some properties out with the design footprint have been taken into account during this study when it has deemed that the proposed route would significantly affect the property.

Table 14 - Property Take/ Land Use Review - Section 1

ROUTE OPTION	DWELLINGS TO BE DEMOLISHED	OUTBUILDINGS TO BE DEMOLISHED
<i>Section 1 - Red</i>	2	2
<i>Section 1 - Purple</i>	4	3
<i>Section 1 -Yellow</i>	2	4

Table 15 - Property Take/ Land Use Review – Section 2

ROUTE OPTION	PROPERTIES TO BE DEMOLISHED	OUTBUILDINGS TO BE DEMOLISHED
<i>Section 2 - Red</i>	6	3
<i>Section 2 - Purple</i>	0	4
<i>Section 2 - Brown</i>	5	4
<i>Section 2 - Blue</i>	2	9
<i>Section 2 - Cyan</i>	0	3

6.9

Buildability

Buildability is a function of building economically, simply and quickly. Buildability assesses the traffic management implications of constructing each option as well as delays to the road users during the construction process. Online options will incur greater traffic management costs compared to offline options. Extensive traffic management and temporary diversions are required to allow construction adjacent to live carriageways, which restrict site access and the working area. Therefore, the percentage of each option that is on-line provides a measure for Buildability. Details of the Buildability considerations are summarised in Tables 16 and 17 below.

Table 16 - Buildability – Section 1

ROUTE OPTION	PERCENTAGE OF ROUTE ONLINE	PERCENTAGE OF ROUTE OFFLINE
<i>Section 1 - Red</i>	0	100
<i>Section 1 - Purple</i>	44	56
<i>Section 1 -Yellow</i>	55	45

Table 17 - Buildability - Section 2

ROUTE OPTION	PERCENTAGE OF ROUTE ONLINE	PERCENTAGE OF ROUTE OFFLINE
<i>Section 2 - Red</i>	17	83
<i>Section 2 - Purple</i>	9	91
<i>Section 2 - Brown</i>	64	36
<i>Section 2 - Blue</i>	14	86
<i>Section 2 - Cyan</i>	6	94

6.10

Health and Safety

All the routes involve extensive earthworks and structures and it is considered generally that the majority of operations could be carried out using normal practices and in accordance with the requirements of current health and safety legislation, in particular Construction (Design and Management) Regulations (Northern Ireland 2007).

Generally the number of structures within Section 1 for each of the routes is similar. Therefore the associated hazard of working at height or over water remain for each of the options, with no option being deemed better than any other. For Section 2 the Red, Brown and Cyan Route have fewer bridges but the associated hazards remain for each of the options.

Areas of soft or weak ground will have an effect on the stability of bulk excavation or trenches. In Section 1 all routes are affected by a small length of ground of this nature. In Section 2, the blue, cyan and purple options are affected by ground of this nature. In addition to the soft ground highlighted above there are a number of locations in Section 2 where there is Made ground and the type of material is unknown. These areas could potentially be hazardous. The routes affected are the Blue, Brown and Red routes.

In Section 1, there is an area of shallow rock within the Red route which may require blasting. This area may also require remedial works to side slopes.

Private Access to properties would require to be maintained throughout the works. Noise and vibration as well as working hours would be restricted and would have to be monitored vigorously along the entire length of the works to minimise the construction effects on local residents and residences. Consequently offline options would be more preferable to online options as the impact on communities would be reduced.

Where there is no practical alternative existing accesses may have to be amended for left in / left out traffic movements only since no right turn vehicle movements would be allowed. Also new access roads may be required to collect clusters of properties with left in / left out access arrangements. The options most affected by this type of arrangement would be the online options, namely Yellow and Purple options in Section 1 and the Brown option in Section 2.

Options with a high degree of online widening require building adjacent to live carriageways. A major construction constraint would be the need for significant traffic management measures needed to maintain traffic flows on the A6. This is particularly relevant to the Yellow option in Section 1 and the Brown option in Section 2 where there is a high percentage of the route online.

Working adjacent to a live carriageway also creates the hazard of vehicular accidents due to the close proximity of site traffic and site staff and traffic using the adjacent road. Another

hazard identified when working adjacent to a live carriageway would be blasting/drilling. The hazard in this case would be both for the public and site staff. Again this would be particularly relevant to the Yellow option in Section 1 and the Brown option in Section 2 where there is a high percentage of the route online.

Public Utilities can pose a problem during construction however it is electricity lines that provide the greatest hazard possibly resulting in fatal accidents and damage to lines. Live services may be struck by machinery when working under or near overhead lines, for example by excavator hydraulic arms or lorries. The offline options minimise this type of risk. . Least conflict would occur on the Red route in Section 1 and the Red and Cyan routes in Section 2.

7 Summary of Environmental Impact Assessment

7.1 Overview

This section of the report provides a summary of the key findings for each chapter in the report in individual sections below. It is followed by a considering summary of the findings and provides guidance on an emerging preferred route

7.2 Air Quality

7.2.1 Local Air Quality

The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options. Major beneficial impacts are predicted within Dungiven as the bypass redirects traffic away from the town and all route options result in similar effects within Dungiven. Adverse impacts of up to minor adverse significance are predicted where new roads pass near to residential properties.

The predictions calculated using the DMRB are indicative of the likely reductions that the town may experience. All proposed options show a predicted decrease in NO₂ concentrations of around 20-25% (7-9 µg/m³) at selected sensitive receptors on Dungiven Main Street, within the AQMA. No one route option shows any significantly greater benefit than any of the others within the Dungiven AQMA.

The DMRB predictions indicate that by 2016, even without a bypass, NO₂ concentrations will be below the air quality objectives. Therefore, by 2016, assuming air quality legislation is not altered; there may not be a necessity for an AQMA in Dungiven. However, the predictions should be treated with caution; there is inherent uncertainty in making predictions so far in the future, and nationwide NO₂ concentrations have not been falling as has been widely predicted.

Therefore, despite the model predictions, it should not necessarily be assumed that NO₂ concentrations will fall below 40 µg/m³ by 2016 in the absence of a bypass. Nevertheless it is considered very likely that should any of the bypass options be progressed there will not be a necessity for an AQMA in Dungiven in 2016.

The greatest overall local air quality beneficial effect is predicted for the Cyan route (comprised of Section 1: Red route, Section 2: Cyan route), which lies more than 200 m from residential properties in Foreglen, Dernaflaw and Dungiven. The smallest overall beneficial impact is predicted for the Brown Route, which lies closer to both Foreglen and Dernaflaw.

Overall, major beneficial impacts were predicted for the Cyan and Red routes for NO₂, and moderate beneficial impacts were predicted for the four other routes. For PM₁₀, minor beneficial impacts were predicted for all routes.

7.2.2 Regional Pollution and Greenhouse Gases

The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead.

The least adverse impact with regard to emissions from road traffic was predicted for the Yellow route, and the greatest adverse impact was predicted for the Red route.

All options were concluded to have a minor adverse impact on regional air quality and greenhouse gas emissions.

7.2.3 Sensitive Ecosystems

With regard to the assessment of Designated Sites, NO_x concentrations exceed the EU Limit Value at receptor 1, close to Main Street. However a significant decrease in NO_x concentrations is predicted for each of the proposed route options (up to 14% for the Blue route). Concentrations are, however, likely to remain above the Limit Value.

Increases in NOX concentrations at receptors distant from existing roads, but near to or adjacent to the proposed road options all exceed 2 µg/m³, however concentrations at these locations are predicted to remain below the 30 µg/m³ Limit Value.

For all receptors the predicted nitrogen deposition exceeds the critical load due to the habitat type in the area of the road scheme, even before considering the magnitude of the predicted road increment.

7.3 Cultural Heritage

This desk-based assessment has collated baseline data for archaeology and cultural heritage within a study area of approximately 500 m along the proposed route options for the A6 dualling between Claudy and Dungiven.

Data was collected from the Monuments and Buildings Record (MBR), Industrial Heritage Records, the Register of Historic Parks and Gardens, the Northern Ireland Buildings Database, historic maps from the Northern Ireland Records Office, route specific aerial photographs and an archaeological walkover survey.

A total of 99 archaeological sites were identified within the study area. This comprised 30 records from the MBR, nine listed buildings, 25 records from the Industrial Heritage Database, one record from the Register of Historic Parks and Gardens, ten sites identified from aerial photography and 23 sites located during the walkover survey. One battlefield is located within the study area. Two Scheduled Monuments are also located within the study area to the south of Dungiven, namely the Dungiven Priory and a nearby standing stone. Although neither of these monuments would be directly affected by the proposals, the Red, Brown and Cyan routes would disrupt the setting of the monuments as they traverse surrounding land.

The assessment revealed the presence of recorded archaeological and cultural heritage sites dating from the Neolithic to the post-medieval periods within the boundaries of the study area. Ritual and funerary monuments dating to the Neolithic and Bronze Age are present although there are no recorded examples of settlement or domestic activity in the area. Early Christian settlement is recorded with a number of raths typifying this and the settlement evidence continues through the medieval and post-medieval periods.

Previously unrecorded archaeological features are likely to be present within the route corridors. There has been a lack of systematic intrusive archaeological investigation within the region. Any previously unrecorded archaeological features that might exist within the route corridors have the potential to be well-preserved due to the lack of development. There is potential for archaeological features for all periods although those of an earlier date are more likely to have been under-represented in the previously known archaeological record.

7.4 Disruption Due to Construction

Although the construction period is temporary, it is likely to last for several years. Disruption caused during the construction period should be offset by the appointment of an Environmental Manager and the implementation of mitigation measures to minimise the impact of the construction works on the surrounding environment and local population.

Route selection in Section 1 could significantly reduce the disruption caused during the construction period. The Red route would result in significantly fewer homes being within 100 m of the route and is likely to disrupt access to fewer homes as the length of online widening is shorter compared to the Yellow and Purple routes. However, the Red route would require more crossings of local and strategic roads.

The key issues within Section 2 of the proposed dualling scheme involve the number of properties in close proximity to the routes, the number of roads that will be crossed by the different route options and disruption to ecologically sensitive sites. Construction disruption to ecologically sensitive sites (River Roe and Tributaries cSAC) will require a high level of management and a construction environmental management plan will be essential to minimise this impact. The number of properties in close proximity to the routes does vary and this should be considered when establishing a preferred route to attempt to minimise disruption to existing properties. All of the route options are likely to cause significant disruption to traffic along existing routes as a result of construction as all the routes cross several minor roads and at least one B-class road.

7.5 Ecology and Nature Conservation

7.5.1 Section 1: Claudy to Dernaflaw

Choice of route should reflect the least adverse impact on semi-natural habitats. In the case of Section 1, Claudy to Dernaflaw, the preferred route is the Yellow route, followed by the Purple route, with the Red route the least favoured.

Potential impacts on the designation feature of the Faughan River cSAC (Atlantic salmon) and on the designation features of Altmore Glen ASSI (primarily oak woodland) must be considered, but it is unlikely that routes within this section will have a significant impact on these sites.

At this stage, the major potential impacts are on watercourses and their fish populations, and on otter, badger and bat populations. Localised concentrations of breeding birds may also be adversely affected, principally along the Red route.

Mitigation measures provide the opportunity for significant gains for conservation through the creation of new habitats along the route corridor.

7.5.2 Section 2: Dungiven Bypass

The most important issue to be resolved during the route choice process and with regard to both the construction and the operational phases, is the potential impact of the scheme on the River Roe and Tributaries SAC. Road construction has the potential to have adverse impacts on all habitat designation features through habitat loss or deterioration, and on faunal species through increased sediment input reducing the quality of waters and of spawning gravels.

Potential impacts on the designation features of the River Roe and Tributaries SAC: Atlantic salmon *Salmo salar*; 'Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation'; 'Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles'; and Otter *Lutra lutra* must be taken into account in the choice of route, as required by the Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995, as amended.

Choice of route should also reflect the least adverse impact on semi-natural habitats.

In the case of the proposed Dungiven Bypass, the preferred route is the Brown route, followed by the Red, Blue then Cyan route with the Purple the least favoured.

Mitigation measures provide the opportunity for significant gains for conservation through the creation of new habitats along the route corridor.

Severance is also an issue for many species in terms of dispersion and foraging. The Purple route would result in a large parcel of land being isolated from the surrounding countryside between the existing road and the new road, while the Brown and Red routes would result in the smallest plot of land isolated between the new and old roads. This may be a significant factor once the results of the badger survey are known.

7.6 Landscape Effects

The landscape through which all route options pass is relatively high quality overall, as indicated by the AONB designation, the Dernaflaw and Pellipar Historic Houses, the Priory and Standing stone cluster of historic sites, and the LLPA designations throughout.

In terms of landscape impacts the preference is thus for the online routes as far as possible (Yellow route for Section 1 and the Brown route for Section 2).

The extent of the cutting and embankments required by all the offline options through the River Roe Basin would cause a significant impact of Moderate Adverse.

The Cyan Route offers a relative advantage to the Brown and Red routes in its approach to the important Priory area, as landtake is somewhat smaller.

The at-grade roundabout option at the east of Dungiven allows for the road to be in cutting, which would reduce impacts in comparison to the embankment required for the grade separated junction. The landscape effects caused by the Cyan, Brown and Red Routes on the high quality Priory setting could be partly mitigated after 15 years but not on the nearby standing stone.

The Blue Route is longer and offers no clear advantages to the other routes under consideration except for its relative lesser physical impacts on the AONB, as its impacts are

considered to be Major Adverse. It is noted that the Blue route is likely to have an impact on views from the AONB at Benbraddagh. The landscape effects on Pellipar House Demesne also could not be mitigated.

All route options for Section 2 cause, in the best case, have a landscape impact of intermediate to Moderate Adverse and Major Adverse. The Brown is preferred overall as it has the largest online area. There is a relative advantage to the Cyan route when compared with Red and Brown in the immediate environs of Dungiven Priory; however, this advantage is small.

In terms of visual impacts the Yellow and Brown routes have the potential for significant adverse impacts on domestic visual receptors, caused by the road widening through Foreglen and Dernaflaw. However, there may be the potential for mitigating impacts arising from online widening; and any online improvement works would remove impacts to rural receptors.

In general however the Blue route is most impactful in terms of visual impacts on section 2; it significantly impacts on views from Dernaflaw house and nearby properties, Pellipar House and Park, a large swath of residential receptors to the north and east of Dungiven settlement, and views from Benbraddagh. The Blue route impacts the largest number of domestic visual receptors by affecting large numbers of homes on the north side of Dungiven which is cumulatively greater than the other routes in impact. Adding the factors where the Blue route creates greater impacts, overall it would be more adverse than the other routes.

For all southern bypass routes views from the new road would probably be major beneficial impact in creating a desirable view towards Dungiven town and castle set on a hill, framed by Benbraddagh, which could be a dramatic and positive image of Dungiven.

Visual effects caused by the Cyan, Brown and Red Routes on the views from the Priory and associated sites, a particularly important receptor, could be partly mitigated after 15 years but not on the nearby standing stone.

All southern routes affect views from some rural properties, with the Brown route impacting further on the central area of Dernaflaw, although there is a high visual exposure to the road here already and this affects the relative magnitude of the changes amongst many of the properties backing on to the A6; planting and other mitigation should be possible for most properties to reduce impacts.

The overall greater visual impact arises from the Blue route and the remainder are not conclusive in terms of preference. The Brown route has significantly less impacts on views over the Roe Basin and is therefore preferred over the Red, Cyan and Purple routes, despite the visual impacts to receptors in the Dernaflaw area.

7.7

Land Use

The Red route within Section 1 and the Purple route in Section 2 will require the least number of total demolitions. The Red Route will result in the smallest loss (1949m²) of gardens and parking areas within Section 1, while the Purple route will result in the smallest loss (335m²) of gardens and parking areas for Section 2 (1265m²).

The Red route within Section 1 will not result in the loss of community land, while the Yellow and Purple routes will result in a loss of community land arising from encroachment on existing community facilities in Foreglen. The Purple route will cause the least community land loss for the options within Section 2.

The Red route will result in the smallest loss of development land of the options in Section 1, while the Purple route will not result in the loss of any development land within Section 2.

In terms of the impact on agricultural land, there is no BMV land in Section 1; however there will be impacts to farmers associated with severance and access to fields. In calculating this impact the Red Route was preferred because of its impact on 25 landowners, severs 17 farm units and 24 accesses and impacts 15 other farms.

Within Section 2 the Blue route will result in the lowest loss of BMV land. However, the Cyan route with a grade separated junction will impact on the least number of landowners (15). The Brown routes will sever the least number of farm units (3) and accesses (4). The Red and Cyan routes inclining the grade separated junction will impact the least number of other farmers (5). Overall in terms of agricultural impacts in Section 2 the Cyan route, including the grade

separated junction, east of Dungiven is preferred because it impacts 15 landowners, severs 3 farm units and 11 accesses and affects 5 other farmers.

7.8 Traffic, Noise and Vibration

7.8.1 Section 1 Claudy to Dernaflaw

For each option there are more benefits than dis-benefits. In the Year of Opening, within the core study area, the greatest benefit occurs for the Purple route. However, in the Future Year the Yellow option provides the greatest benefit for residential properties.

Yet, when comparing the impacts for properties within 600m of the route options the Purple route option provides the greatest ratio of benefits to dis-benefits. Again, in the Future Year, in terms of benefits and dis-benefits the most favourable route option is the Yellow option. The Red route provides the greatest number of dis-benefits.

In terms of vibration the Red route provides the greatest reduction in properties potentially affected by vibration, and only one previously unaffected.

Both the Purple and Yellow routes result in the least increase in area adversely affected by noise; 2,615m² and 246m², respectively compared with 93,743m² for the Red route option. In addition, it can be seen that for all route options there is a significant area that will experience noise reductions of at least 1dB or more. However, at this stage it is not apparent as to whether the changes occur within what may be classed as high or low value community areas (however high and low may be defined).

7.8.2 Section 2 Dungiven Bypass

The Blue route results in the greatest number of dis-benefits within both the Core study area. Within 600m of the Blue Route option and the Purple route provides the greatest number of benefits.

In terms of vibration the Blue route provides the greatest reduction in properties potentially affected by vibration, but also has the greatest increase in properties potentially increased vibration annoyance. The Cyan, Purple and Red routes have very similar vibration impact changes, whilst the Brown option results in the least number of properties predicted to experience a decrease in noise, but the most that will experience no change.

There is a large increase in the overall community area that will experience an increase of at least 1dB or more in noise level, with the Blue option experiencing the least. However, at this stage it is not apparent as to whether the changes occur within what may be classed as high or low value community areas (however high and low may be defined).

7.9 Pedestrians, Cyclists, Equestrians and Community Effects

Crossing of the A6 by Non-motorised users (NMUs) is not prevalent along the Claudy to Foreglen section of the A6 because currently there are fewer community facilities and houses along this section than in the Foreglen and Dernaflaw areas. If additional housing and associated amenities were to increase in this area this situation could change, however, at this stage this has not been factored into the assessment.

The proximity of housing and community facilities on opposite sides of the road in Foreglen and Dernaflaw results in substantial crossing activity along the existing A6 within the vicinity of these two villages.

The NMU survey results suggest that Bleach Green Lane, the entrance to equestrian facilities east of Dungiven) and the access route / right of way to Dungiven Priory are the most used NMU routes. Preventing NMUs from using these routes or restricting access to these routes will have significant effects on NMUs and the incorporation of NMU facilities to prevent adverse effects should be taken into account in design.

The NMU surveys revealed that NMU survey location along the route of the National Cycle Network were the routes most used by cyclists, and bus stop at the Dernaflaw Road Junction was heavily used by local residents. These results need to be taken into account during detailed design.

In Section 1, the Red route is the preferred route because it will resolve existing severance issues through Foreglen and make journeys made by NMUs easier and quicker.

In Section 2, the Purple route is the preferred option, as it will have the least effect on existing NMU routes and resolve existing severance within Dernaflaw and Dungiven. NMU access arrangements to Dungiven Priory and Church will, however, have to be taken into account during detailed design.

7.10

Vehicle Travellers

The views from the existing A6 are predominantly intermittent to open with the occasional area of restricted views within settlements. For section 1, the views range between intermittent and open and all of the route options will retain intermittent to open views. A larger proportion of the Red route will have open views compared to the remaining proposals as this option diverts offline for the longest distance. For Section 2, the view from the existing A6 Foreglen Road ranges from intermittent to open and from restricted to intermittent within the settlement development limits of Dernaflaw and Dungiven. The proposed dualling scheme will open views as all the route options will bypass Dungiven and most will also bypass Dernaflaw. However, views will be restricted to varying degrees for each option due to the cut slopes proposed.

The A6 in its present condition is a source of driver stress, with high traffic flows. In Section 1 (Claudy to Dernaflaw), the stress relates to the existing road layout requiring traffic to slow so drivers can enter / exit minor roads and the frustration associated with waiting at these roads to get onto the A6 Foreglen Road. There may also be a fear of accidents along this section due to the number of local non-motorised users along the fringes of the road. In Section 2 (Dungiven Bypass), the stress relates to high traffic volumes, particularly in Dungiven Main Street. There are also issues with parking problems and fear of accidents with non motorised users. All of these issues are not conducive to the steady flow of traffic.

The route options for both sections, which have been proposed as part of the assessment, will have a positive effect through diverting the route away from centres of congestion, widening the route and improved junctions. Conditions would be substantially improved as traffic flows would be reduced through the existing settlements, thereby improving road safety. Route uncertainty may increase for a short period during and after construction as local users are forced to navigate construction works and new road routes. However, in the long term route uncertainty should be improved due to through-travellers being able to follow a direct route without opportunity for incorrect turns.

In conclusion, the preferred option for each criterion for Section 1 (Claudy to Dernaflaw) was the Red route which was preferred in term of view from the road, frustration, fear of potential accidents and uncertainty of route.

The preferred options for Section 2: Dungiven Bypass was the Red and Cyan routes in relation to view from the road, The Red, Purple, Cyan and Blue routes in relation to frustration. The Purple and Blue routes in terms of fear of potential accidents and the Red, Purple and Cyan routes in relation to uncertainty of route

7.11

Road Drainage and the Water Environment

This assessment has considered the merits of the various options for the improvement of the A6 between Claudy and Dungiven with regards to the water environment, including surface water quality, groundwater and flood risk. It has also considered the potential adverse impacts during the construction and operation phases of the development.

There are a large number of variables to consider when defining a preferred option with regards surface water environment. Each route will have an impact and mitigation measures will need to be implemented during construction and operation to treat runoff/control spillages. In relation to section 1, there was no clear preferred option in terms of surface water impacts, the Red route was preferred in relation to groundwater and there was a slight preference for the Red route in relation to flood risk. For section 2, there was a slight preference for the Blue route in relation to surface water, the Blue route was preferred in relation to groundwater and there was a slight preference for the Red route in relation to flood risk.

With regards surface water quality there is the possibility of temporary and short term moderate/large adverse impacts during construction due to the very high importance of some local watercourses. As a result stringent mitigation measures will be needed during construction and environmentally sympathetic designs for river crossings will need to be employed. However, the possibility of introducing modern treatment and containment facilities could have a slight beneficial impact in the long term. Consultation with statutory consultees will need to be

maintained throughout this development phase. Impacts predicted in this assessment will need to be revised as the proposal is developed further during the detailed design phase.

An assessment of the baseline conditions along the proposed A6 route corridor has been undertaken in relation to hydrogeology. This informed a qualitative assessment that has identified that potential moderate adverse impact may occur during the construction and operational phase of the proposed scheme in relation to hydrogeology. However, it is considered that the adverse impacts can be mitigated through ensuring good site practice and management during construction works and undertaking a Controlled Waters risk assessment. Appropriate treatment and containment facilities will be required to mitigate the potential adverse impacts from runoff and highway spillages during the operation phase. Information obtained from the ground investigation should be used to undertake a Controlled Waters risk assessment to determine if potential pollutant linkages exist or may be formed by the operational works. The resulting residual impacts are considered to be neutral.

Taking into account how the A6 route options should be designed and the mitigation measures that should be implemented, the risk of flooding from all sources to the A6 route options, and the areas surrounding the road are considered to be low and acceptable

7.12 **Geology and Soils**

Choice of route should reflect the least adverse impact on geological and soil attributes and on potentially injurious contaminated land sites.

7.12.1 *Section 1: Claudy to Dungiven*

Yellow Route

The potential for release of contaminants from contaminated land site LY050/009, a former petrol station / fuel storage area, should be assessed.

Red Route

The stability of peat masses to the south east of Foreglen should be taken into account.

Purple Route

The history of contaminated land site LY050/036, described as reclaimed land, should be investigated prior to construction. The potential for release of contaminants from contaminated land site LY050/009, a former petrol station / fuel storage area, should be assessed.

7.12.2 *Section 2: Dungiven Bypass*

Red Route

A depot with covered tanks at IGR C 678 092 should be investigated prior to construction as disturbance of this site has the potential to release any entrained contaminants into the environment.

Brown Route

The Brown Route passes directly through a field infested with PWD, and construction practices will need to be managed accordingly.

Purple Route

The route crosses the site of a former textile mill at IGR C 666 086. Disturbance of this site may have the potential to release any entrained contaminants into the environment and should be investigated prior to construction.

Cyan Route

The route crosses the site of a former textile mill at IGR C 666 086. Disturbance of this site may have the potential to release any entrained contaminants into the environment and should be investigated prior to construction.

Blue Route

The route passes within approximately 100 m of the Dernaflaw ESCR site, which should be protected during the construction phase.

The Blue route passes directly through a field infested with PWD, and is adjacent to another infested field, and construction practices will need to be managed accordingly.

7.13

Impact of Road Schemes on Policies and Plans

A detailed assessment in accordance with DMRB Stage 2 guidance has been undertaken to assess the impact of the scheme in relation to Policies and Plans.

All of the route options conform to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 - 2012. The routes will improve passenger journeys and freight transport links between Belfast and Londonderry.

The non compliances relate to:

- the potential encroachment of greenbelt on the route section at Dungiven designated by, Policy GB_CPA1 Designation of Greenbelts and Countryside Policy Areas, in 'A Planning strategy for Rural Northern Ireland' and superseded by 'PPS 21: Sustainable Development in the Countryside',
- the potential for the Blue Route in Section 2 to breach PPS6 Policy BH 6 The Protection of Parks, Gardens and Demesnes of Special Historic Interest, as a result of its impacts on Pellipar House Demesne.

There are several aspects of the proposed scheme which may have major significant impacts before mitigation measures are put in place. These include; the identification of several areas of constraint on mineral developments within Section 1 and Section 2 of the proposed scheme. Under Policy MIN 3 Areas of Constraint in 'A Planning Strategy for Rural Northern Ireland' these impacts must not be allowed to be significant and mitigation will be needed.

There is potential for major impacts on watercourses and their fish populations, breeding birds, otter, and badger and bat populations within the study area. PPS2: Planning and Nature Conservation strives to maintain the effective conservation of wildlife and mitigation will be required to achieve this recommendation.

The Red, Brown, Purple and Cyan routes of Section 2 will have a moderate adverse impact on Dungiven Priory Scheduled Monument and the Standing Stone Scheduled Monument located in Dungiven. Policy BH 1 the Preservation of Archaeological Remains of Regional Importance and their Settings in PPS6 seeks to protect and conserve archaeological remains and mitigation will be required to comply with this policy.

The Blue route of Section 2 will pass through Pellipar House and may affect Browns Bridge and Derryware Bridge which are designated as industrial heritage sites. In order to comply with Policy BH 11: Development affecting the setting of a Listed Building in PPS6 mitigation measures will be needed for any activities which may have an effect on the industrial heritage sites.

There are also potential significant impacts to the differing community receptors for the various routes and mitigation will be required to comply with Policy ECU 2: Protection of Community Facilities, Draft northern Area Plan 2016. In Section 2 a number of community facilities in Dernaflaw may be affected by the Red and Brown routes, while further east, near Dungiven, the Red, Brown and Cyan Routes may also have an impact on the existing access to the Dungiven Priory and the Blue route may traverse playing fields at Drumane Road.

7.14

Overall Conclusion

There are several key issues arising from the different disciplines of the environmental appraisal of the route options for the A6 dualling scheme between Claudy and Dungiven. These issues vary depending on the route alignment and the adjacent local environment; however, the key issues are those surrounding impacts to those receptors along the existing A6 (access disruption, land and property loss, noise, vibration and air quality), impacts to the Dungiven Priory and associated area, and a variety of potential impacts on the designation features of the associated Natura 2000 sites (River Roe cSAC).

There is an overall slight preference for the Red Route in Section 1 and the Cyan Route in Section 2; however, these results are not definitive as the selection of a single route option does not consider the complexity of the potential impacts within each individual assessment.

Impacts on the setting of the Dungiven Priory and nearby scheduled standing stone will need to be addressed for any option that passes between the Priory and the Standing Stone (Brown,

Red and Cyan). Detailed consultations have begun with NIEA Built Heritage in relation to the potential impacts on the setting of the Priory and the Standing Stone. These preliminary consultations have resulted in the agreement of an over-bridge providing access to the Priory along Priory Lane. It should be noted that the provision of an over-bridge at this location requires the road to be in cutting; this is technically required by the at-grade separated junction to the east of Dungiven (and is not facilitated by the grade separated junction).

Maintenance of access and mitigation (landscaping) for the Priory area will be a key consideration for any of the Brown, Red or Cyan routes at the EIA stage. It is the intention of the EIA and design team to engage meaningfully with the NIEA Built Heritage, and other stakeholders, as relevant, in agreeing the detailed design for the Dungiven Priory and associated area.

A key and fundamental consideration is the potential impact to the European designated site, the River Roe cSAC, arising from these routes; however, it appears at this stage that the Cyan Route will not have significant impacts on the cSAC with design mitigation in place. This will be further borne out by the ongoing Appropriate Assessment work being conducted (as required by the Habitats Directive 92/43/EEC and DMRB Interim Advice Note 110/08).

8 Summary of Traffic and Economics Appraisal

8.1 Introduction

A detailed assessment of the traffic and economic aspects of each route option has been carried out and detailed in the Economic Assessment Report issued April 2009.

The economic analysis of each route option has been completed using COBA (Cost Benefit Analysis) version 11 revision 7. COBA compares the cost of a scheme with the associated user benefits from reduced journey times, accident savings, etc. for the existing and proposed scenarios. COBA assesses the costs and user benefits over a 60-year period after road opening. Procedures and guidance for developing and applying COBA are set out in Design Manual for Roads and Bridges (DMRB: Volume 13).

8.2 Methodology to Assess Monetary Costs and Benefits

8.2.1 Basic Data

The start of the construction has been assumed to be 2013 with a construction period of 3 years. This results in the first scheme assessment year being 2016, and the last scheme assessment year being 2076.

Peak hour tidality ratios on the A6 have been measured as 49.9%/50.1% and it has therefore been assumed that there is no significant tidality.

The E and M factors contained within DMRB Vol. 13 have been used assuming a Non Built-up Trunk network and seasonality factor of 1.1. This resulted in $E=1.15$ and $M=364$.

8.2.2 Traffic Flows

The series of traffic surveys were undertaken for this assessment, including Automatic Traffic Counts, Manual Classified Counts and Journey Time Surveys. They are detailed in the Traffic Survey Report (dated November 2008). The majority of the surveys were undertaken in April 2008.

The traffic survey data formed the basis of the spreadsheet based traffic model developed for the study. A suitable forecasting methodology was adopted to growth the observed traffic flows up to opening year levels (2016).

Within the COBA model, the 2016 opening year flows were input as 24 hour, 7-day AADT flows.

8.2.3 Vehicle Category Proportions

The vehicle category proportions used in the assessment were based on those recorded in the 2008 surveys and adjusted to annual average proportions as per the requirements of DMRB Volume 13. It should be noted that traffic survey data for the A6 only was used to deduce these proportions i.e. side roads and Dungiven town links were not used.

8.2.4 Traffic Growth

Post 2016, the COBA default growth rate i.e. NRTF Central, was assumed for the assessment years.

8.2.5 Link Classification

The existing links within Dungiven town have been classified as 'urban' single carriageways in the modelled networks. All other links have been classified as 'rural' single carriageways due to the speed limit of the road and the levels of development present:

In all cases, default values have been assumed for hilliness and bendiness.

8.2.6 Junction Classification

For each existing priority junction, it was assumed that each arm had single carriageway arms with no tidality. The respective 'maximum junction delay' was set as 120 seconds for each junction.

Where a junction had a right-turn ghost island in place, this was included within the COBA junction model. Measurements from the OS Base layout at each of the junctions were taken regarding lane widths and visibility distances for turning traffic.

Junctions within Dungiven town were modelled as 'urban' or 'small town' and all other junctions were modelled as 'rural'.

For all junctions, the daily traffic turning proportions were used.

8.2.7

Accident Data

DMRB Vol. 13 recommends that local accident data (collision data), which can be obtained from the appropriate police or local authority, should be used where available and "should relate to a period when conditions on the road have been broadly unchanged (e.g. no abnormal changes in traffic flow, no changes in junction design or road geometry, etc)". The manual also states that "local data should normally cover the five years previous to the COBA assessment and must cover at least 3 years".

In accordance with DMRB Vol. 13, 5 years of local collision data has been used covering the period 2002 to 2006 inclusive.

The locations of the collisions were used to allocate the accident numbers onto the appropriate COBA links and nodes.

8.2.8

Model Validation

Journey time measurements are required to both validate and calibrate the COBA model and to assist in assessing any re-assignment effects resulting from the improvement of the A6 route, in particular traffic by-passing Dungiven.

Journey Time Surveys were carried out on two separate weekdays, namely Tuesday 30th September 2008 and Tuesday 7th October 2008 on the A6 between Dungiven and Claudy.

The measurements were conducted using the moving observer method.

As recommended, the measured and COBA journey times for the whole of the route were compared, the results showed a fit for purpose validated model.

8.2.9

Scheme Costs

The following assumptions have been used in the COBA models with regard to scheme costs:

- Preparation costs to be incurred between 2009 and 2012;
- Land costs to be incurred at the start of the 2012 financial year;
- Construction costs to be incurred between 2013 and 2015 inclusive, as follows in standard profile:
 - 2013 – 30%
 - 2014 – 34%
 - 2015 – 33%
 - 2016 – 3%
- Supervision costs 5% spread over construction period, 2013 to 2016; and
- Scheme to be completed by the end of 2015, with opening year of 2016.

8.2.10

COBA Do Minimum Network

All links and junctions where the flows are likely to change because of the proposed schemes have been included.

All existing road junctions, where traffic counts surveys were undertaken, have been explicitly coded within the COBA models so as to allow a more accurate assessment of the benefits of improvements proposed as part of the Do-Something schemes i.e. all significant junctions, or side roads where major junctions are proposed as part of the schemes.

8.2.11

COBA Do Something Network

Links

The additional links as required for the Do Something network were coded into the models for each respective route. Various Do Minimum links/nodes were removed from the network as a result of the scheme.

Junctions

Additional/revised priority junctions as part of the scheme were coded appropriately within the COBA models.

The various new roundabouts (including those grade-separated) were coded as such within the COBA models. Specific measurements for each junction were taken as required.

The merges of slip a road onto the main dualled a section of the A6 were modelled as such within the COBA models and diverges were modelled as simple dummy nodes.

For each junction, the daily traffic turning proportion was used.

8.3

Operational Appraisal

8.3.1

Base Traffic Model

The base year model required the undertaking of a series of traffic surveys to determine existing travel patterns. The surveys included:

- Origin – Destination Surveys (ODs);
- Manual Classified Counts (MCCs);
- Automatic Traffic Count (ATCs); and
- Journey Time Surveys.

The manual classified turning counts at the selected sites were undertaken during a 12 hour period 07:00-19:00, with the data collected in 15-minute intervals.

Vehicles were classified into the following categories:

- Pedal Cycle;
- Motor Cycle;
- Cars and Light Goods Vehicles (LGV);
- Other Goods Vehicles 1 (2 or 3 Axles)
- Other Goods Vehicles 2 (4+ Axles); and
- Buses/ Coaches.

A further 6 manual counts were carried in November 2008 by AECOM further facilitate the traffic modelling of the proposed road schemes. However these counts only included traffic movements into and from the side roads.

The counts at these sites were undertaken during the AM peak (08:15-09:15) and the PM peak (17:00-18:00), with the data collected in 15-minute intervals.

8.3.2

Automatic Traffic Count Surveys

The Automatic Traffic Count (ATC) surveys were carried out during two periods, Saturday 17th November – Sunday 2nd December 2007 and Saturday 12th April – Monday 28th April 2008 at the following sites:

- Site A1 – Foreglen Road, Dungiven
- Site A2 - Ballyquin Road, Dungiven
- Site A3 - Station Road, Dungiven
- Site A4 - Chapel Road, Dungiven
- Site A5 - Feeny Road, Dungiven
- Site A6 - Foreglen Road, Dungiven
- Site A7 - B74 Glenshane Road, Dungiven

It should be noted that during the 2007 survey counter A2 was damaged and subsequently data from this period is unavailable.

The ATC's recorded traffic volumes split by hourly intervals and vehicle classification. Furthermore, vehicle speeds were recorded in hourly intervals

8.3.3

Journey Time Surveys

Journey Time Surveys were carried out on two separate weekdays, namely Tuesday 30th September 2008 and Tuesday 7th October 2008 on the A6 between Dungiven and Claudy. There were a total of 6 routes surveyed. Nodes were designated along the routes at

intersections with major junctions or other notable features such as 30mph zones; the time taken from node to node was recorded with all junction and link delays noted.

The model was developed for both the AM peak hour (08:15-09:15) and the PM peak hour (17:00-18:00) on the basis of traffic survey data collected in April 2008. The 2008 AM peak hour flow was recorded as 1251 vehicles of which 615 were bound for Londonderry. The 2008 PM flow was recorded as 1461 vehicles of which 782 were bound for Londonderry which overall shows a greater level of traffic in the PM peak period.

More detailed information on the surveys is included in the Traffic Survey Report, dated 1st December 2008.

8.4 Road Safety

The proposed schemes through the introduction of grade separated junctions (GSJ's) in the mainline, improves road safety. The proposed junctions are designed to the latest standards, removing potential conflicts between pedestrians and traffic and removing right turns.

Within the COBA program, there are various accident models that calculate the number of accidents. For links, these relate primarily to link type, whereby if one link is replaced by another link with a lower accident rate then benefit is calculated, and vice versa. For junctions, the accident model takes account of both total flow and flows opposed by each other. The respective junction type is also a factor in the calculations.

In addition, the proportion of slight accidents (typically lower 'cost' but highest in frequency) varies between certain junction types, meaning one type of junction can have a greater/lesser proportion of slight or serious accidents, which has a cost implication.

For Section 1 all route options decrease the number of predicted personal injury accidents, whereas all route options in Section 2 increase the number of predicted personal injury accidents.

8.5 Economic Appraisal

8.5.1

General

The economic benefits attributable to a highway option are calculated by comparing the user and capital costs incurred in the Do-Something with those of the Do Minimum.

The network capacity of Dungiven town centre will be positively affected by the proposed bypass i.e. route options section 2 in terms of traffic flows. Both 2008 and 2016 flows were compared at the same point within Dungiven town from Ballyquin Road to New Street. The current AADT through Dungiven town centre has been counted as 15,700 vehicles with 8% of these registered as HGV's.

From Ballyquin road to New Street the forecast 2016 Do-Minimum AADT flow is 19397 vehicles. For the section 2 red, purple, brown and cyan routes, 48.5% of the total traffic will remain in the town centre i.e. 9415 vehicles. Therefore 9982 vehicles will use the bypass of Dungiven i.e. 51.5% of the total traffic which leads to a potential 2-4 minute travel time saving through Dungiven. This was calculated on the basis of the all or nothing assignment whereby if journey times are less on the bypass then all traffic will re-assign to the faster route, all through traffic passing through Dungiven on the A6 diverts to use the by-pass.

The comparison has been carried out with regard to link transit, junction delay, vehicle operating costs, tax revenues, and accident costs as well as the capital cost of the improvement using COBA. The economic analysis of the proposed routes has been completed using COBA (Cost Benefit Analysis) version 11 revision 7.

These aspects are discussed in detail below and the costs and benefits are summarised in the Table 18 overleaf. Combinations of results for the preferred route of red/cyan are also shown in Table 19 below.

8.5.2

QUADRO

QUADRO assesses the costs to road users of both regular maintenance and scheme construction on a road section. In addition to the actual cost of the works there are three elements of road user cost; delay (value of time), vehicle operating costs and accident costs.

In terms of maintenance, QUADRO is used to compare the cost of a maintenance programme in both the do minimum and do something scenarios. As an improved/upgraded road section

would generally require less maintenance than the existing section (due to improved construction and design), there is a saving in terms of maintenance costs to both the road authority (lower costs) and road users (fewer delays etc).

For the proposed upgraded section of the A6 between Dungiven and Claudy, part of the dual carriageway will run off-line and some on-line (over the existing alignment). On the off-line sections, the existing 'old' sections of the A6 will remain open, however with greatly reduced traffic volumes. Both the 'old' and new off-line sections will require future maintenance which will have an inevitable cost. However, on the on-line sections, the 'old' sections are completely replaced by new carriageway and hence it is anticipated that a maintenance saving is achieved.

In terms of construction of the route, the on-line sections of the route will have an impact on road users in terms of delays and possible diversion costs. However these sections are small, while the off-line sections will incur little if any delay to road users whilst being constructed.

Due to the above, it is considered at this time that the impact of QUADRO analyses on the appraisal of the various route options will have a 'neutral' impact. Information regarding future proposed maintenance programmes for either the do minimum or do something scenarios is as yet unavailable, meaning that assumptions would have to be made in terms of maintenance intervals and costs. It is therefore proposed that QUADRO assessments are undertaken for the Preferred Route only, at Stage 3 since such assessments are likely to have a neutral impact on option choice at this stage of the study.

8.6

Sensitivity Tests

As part of the economic appraisal, sensitivity tests were carried out in order to identify any potential revisions which could be made to the analysis of the A6 Claudy – Dungiven Dualling Scheme.

Accident sensitivity tests consisted of analysing the difference between recorded collision statistics and default COBA values for accidents.

As per the COBA manual, the preferred method of evaluating accidents is to separate link and junction accidents, using local accident data to define the 'Do-Minimum' rates and the default rates for new links and junctions in the Do-Something. In these circumstances, the local data should normally cover the five years previous to the COBA assessment and must cover at least three years. This was the method used for the COBA analysis of the route options for the scheme.

Other sensitivity tests included variation in the optimism bias between 44% and 25% to see the affect this would have on results. The engineering assessment was costed with 25% optimism bias whilst the economic assessment was costed at 44% optimism bias for the final COBA inputs.

Table 18 - COBA TEE Table

	SECTION 1			SECTION 2				
	RED	PURPLE	YELLOW	RED	PURPLE	BROWN	BLUE	CYAN
Expenditure								
(A) Operating Costs	2.044	1.055	1.573	1.405	1.580	885	1.504	1.217
(B) Investment Costs	71.023	65.660	65.435	82.182	113.256	91.303	92.600	62.637
(C) Indirect Tax Revenues	-9.216	-10.117	-10.163	-2.259	-3.967	-2.203	-5.286	4.769
Present Value of Costs A+B+C = PVC	63.850	56.598	58.846	81.328	110.869	89.985	88.818	68.623
Benefits								
(D) Consumer User Benefits	2.975	-1.717	-3.417	36.780	25.085	46.134	41.128	51.847
(E) Business Benefits	5.671	-0.143	-2.103	41.550	28.734	51.785	46.900	56.582
(F) Private Sector Provider Impacts	-0.243	-0.354	-0.376	0.174	0.014	0.277	-0.017	0.611
(G) Accident Benefits	23.200	26.709	27.084	-3.771	-8.045	-2.814	0.641	0.841
(H) Emissions Benefits	-1.092	-1.200	-1.206	-0.260	-0.466	-0.250	-0.623	0.582
Present Value of Benefits D+E+F+G+H = PVB	30.511	23.294	19.983	71.474	45.321	95.132	88.029	110.463
Overall Impacts								
Net Present Value PVB – PVC = NPV	-33.340	-33.304	-36.863	-6.855	-60.548	5.147	-0.790	41.480
Benefits/Cost Ratio	0.478	0.412	0.352	0.916	0.409	1.057	0.991	1.610
Construction Costs and Lengths of Scheme								
Estimated Construction Costs	83.163	78.197	77.978	94.435	136.969	107.370	107.995	74.450
Length	8.800km	8.843km	8.905km	6.488km	6.296km	6.562km	8.166km	5.601km

All costs are £millions 2002 Prices, discounted to 2002

3.5% discount rate for 30 years, thereafter 3% for remaining 30 years

Table 19 - Preferred Route combined costs

	SECTION 1	SECTION 2	COMBINED RESULTS
	RED	CYAN	
Expenditure			
(A) Operating Costs	2.044	1.217	
(B) Investment Costs	71.023	62.637	
(C) Indirect Tax Revenues	-9.216	4.769	
Present Value of Costs A+B+C = PVC	63.850	68.623	132.473
Benefits			
(D) Consumer User Benefits	2.975	51.847	
(E) Business Benefits	5.671	56.582	
(F) Private Sector Provider Impacts	-0.243	611	
(G) Accident Benefits	23.200	841	
(H) Emissions Benefits	-1.092	582	
Present Value of Benefits D+E+F+G+H = PVB	30.511	110.463	140.974
Overall Impacts			
Net Present Value PVB – PVC = NPV	-33.340	41.840	8.501
Benefits/Cost Ratio	0.478	1.610	1.064
Construction Costs and Lengths of Scheme			
Estimated Construction Costs	83.163	74.450	157.613
Length	8.800km	5.601km	14.401km

(All costs are £millions 2002 Prices, discounted to 2002)

The above table shows the combined COBA results for the preferred route of red/cyan. The combined benefit to cost ratio i.e. BCR is calculated as 1.064. As the combined route, the economic benefits are positive providing the most significant benefits in travel time savings, accident savings, business benefits and lower construction costs compared to some combinations of routes.

9 Summary of Cost Estimates

9.1 Rates Summary

9.1.1 *Explanation of the Rates used for Cost Estimates*

The following is a brief explanation of the unit rates used to calculate approximate costs for each of the route options.

9.1.2 *Source*

The construction costs for all the routes have been calculated using rates provided by Morrison Construction who have been employed on a sub-consultancy basis to provide rates that reflect current construction costs. Land, property and compensation costs are based on rates provided by Land and Property Services (LPS) whilst Flood Mitigation costs are based on the results of a Flood Risk Assessment undertaken by AECOM.

9.1.3 *Assumptions*

The following is a summary of assumptions made in the Cost Estimates:

- Contractor's preliminaries are assumed to be 15% of construction costs and include traffic management;
- Preparation costs are assumed to be 9% of the total of construction costs and land and property costs;
- Supervision costs are assumed to be 5% of the total of construction costs and land and property costs;
- Ancillary costs are assumed to be 60% of the total of Road Pavement, Earthworks and Structures costs;
- The new road pavement thickness is based on a Design Traffic figure of 40msa;
- The new road pavement construction is assumed to be a 200mm thick sub-base layer, 200mm thick base layer, 90mm thick binder layer and 30mm thick surfacing layer;
- For areas of online widening, the existing asphalt thickness for the 7.3m wide carriageway will be re-used as a substitute for new sub-base and capping layers;
- The sub-grade is assumed to have a CBR of 8%; a 200mm thick capping layer is required beneath a 200mm thick sub-base layer;
- The percentage of cut material reusable as fill was assessed for each route and advised by AECOM's Geotechnical Section. This material would be retained on Site and transported for use in areas where fill material is required;
- Earthworks volumes are based on 1:3 slopes and also include the road box depth of 520mm which excludes the depth of capping;
- The Optimism Bias' for the Engineering Assessment Cost Estimates are assumed to be 20% of all costs excluding land costs plus 10% of land costs, while the Optimism Bias' for Economic Assessment Cost Estimates are assumed to be 44% of all costs.

9.1.4 *Sensitivity of Cost Estimates*

It can be seen from the above that the cost estimates are largely based on the sum of the earthworks, pavement and structures costs, the various multipliers applied to these elements for preliminaries, preparation, supervision and Optimism Bias means that for every £1 spent on these three elements, £2.52 is added to the final cost estimate. Clearly, accurate rates for pavement, earthworks, and structures are crucial to achieving an accurate cost estimate.

The rate assumed for importing earthworks material is much higher than other earthworks rates, consequently the earthworks costs, and ultimately scheme cost, is very sensitive to the rate assumed for import of material. The rate adopted for import is very similar to that used in the current Roads Service DBFO Package 1 M1/M2 Westlink contract and as such we are confident that the earthworks cost estimates reflect the true cost.

9.1.5 Land & Property Costs and Source

Land and Property Services (LPS) have provided an individual assessment of the value of each plot of land affected by the proposed routes including the value of any buildings and an allowance for compensation.

9.2 Cost Summary

A summary of the scheme Engineering Cost Estimates for Sections 1 and 2 can be seen in Tables 20 and 21 respectively below.

Table 20 - Cost Summary Section 1

	SECTION 1 - RED	SECTION 1 - PURPLE	SECTION 1 - YELLOW
<i>Preliminaries (£)</i>	6,559,723	6,182,523	6,164,864
<i>Pavement (£)</i>	11,874,727	14,100,099	14,626,847
<i>Earthworks (£)</i>	9,209,811	7,249,645	6,522,690
<i>Structures (£)</i>	6,247,643	4,410,770	4,537,395
<i>Ancillary (£)</i>	16,399,309	15,456,309	15,412,159
<i>Land and Property (£)</i>	2,999,250	1,913,850	1,930,950
<i>Preparation (£)</i>	4,796,142	4,438,188	4,427,541
<i>Supervision (£)</i>	2,664,523	2,465,660	2,459,745
<i>Flood Mitigation (£)</i>	0	0	0
<i>Optimism Bias (£)</i>	11,850,301	11,052,024	11,023,343
Total	72,601,429	67,269,068	67,105,533

Table 21 - Cost Estimate Summary Section 2

	SECTION 2 - RED	SECTION 2 - PURPLE	SECTION 2 - BROWN	SECTION 2 - BLUE	SECTION 2 - CYAN
<i>Preliminaries (£)</i>	7,407,472	10,820,658	8,457,744	8,505,669	5,987,698
<i>Pavement (£)</i>	9,083,707	8,025,843	10,712,035	11,720,802	6,729,319
<i>Earthworks (£)</i>	12,773,041	21,861,790	15,781,640	11,068,441	6,594,446
<i>Structures (£)</i>	9,007,718	15,198,442	8,746,925	12,651,043	11,624,976
<i>Ancillary (£)</i>	18,518,679	27,051,646	21,144,360	21,264,172	14,969,245
<i>Land and Property (£)</i>	4,643,000	1,936,900	3,553,800	4,219,250	2,343,400
<i>Preparation (£)</i>	5,529,025	7,640,575	6,155,685	6,248,644	4,342,418
<i>Supervision (£)</i>	3,071,681	4,244,764	3,419,825	3,471,469	2,412,454
<i>Flood Mitigation (£)</i>	188,250	273,675	144,600	38,543	139,500
<i>Optimism Bias (£)</i>	13,580,214	19,217,169	15,267,943	15,415,682	10,794,351
Total	83,802,787	116,271,462	93,384,558	94,603,714	65,937,807

10 Summary Tables

10.1 Introduction

The brief for the scheme stated that both DMRB and WebTAG should be used to appraise the route options, therefore a combination of both headings has been interpreted and input into an summary table for each option within each section in order to achieve optimum assessment levels. These are included in Appendix 1.

10.2 The Environmental Objective

This objective deals with impacts on both the built and natural environment and on people. The following 12 sub-objectives were examined, which were derived from the environment objective;

- Air quality;
- Cultural Heritage;
- Disruption due to construction;
- Ecology and nature conservation;
- Landscape and visual;
- Traffic noise and vibration;
- Vehicle travellers;
- Water quality and drainage;
- Geology and soils;
- Land Use;
- Pedestrians, Cyclists, Equestrians and Community Effects
- Impacts on Policies and Plans

10.3 The Safety Objective

The main impacts of safety relate to the need to reduce accidents and the associated impacts.

10.3.1 Accidents

Transport accidents impose a range of impacts on people and organisations, including:

- pain, grief and suffering¹;
- lost economic output¹;
- medical and healthcare costs¹;
- material damage²;
- police and fire service costs²;
- insurance administration²; and
- Legal and court costs².

Those impacts marked (2) are closely related to the number of accidents, while those marked (1) are related to the number of casualties. Therefore, numbers of accidents and numbers of casualties form the key quantitative indicators for the appraisal of transport interventions. Combining these numbers with values for the prevention of casualties and accidents yields a monetary estimate of the accident-related costs or benefits of proposed transport interventions.

The accident impact of major road transport interventions have been appraised using the methods set out in the COBA Manual (Dept of Transport). These are embodied in the COBA computer program, which has been used to forecast changes in the numbers of accidents and casualties, and estimate the monetary value of these impacts.

10.4 Economy Objective

There are two sub-objectives under the economy heading examined here:

- Transport Economic Efficiency; and
- Reliability.

10.4.1 *Transport Economic Efficiency*

The Transport Economic Efficiency table (TEE) presents the net user benefits disaggregated by group (i.e. consumers on the one hand and business, including transport operators, on the other), by mode of transport and by impact (time, vehicle operating costs, etc). All entries in the TEE table should be Present Values - that is, streams of costs and benefits occurring over the appraisal period should be discounted to the Department's standard base year using the Department's standard discount rate. This implies that benefits received far in the future are given less weight than benefits received today, in line with social preferences.

Those net user benefits provide an assessment of the savings to society as a result of the introduction of the scheme.

10.4.2 *Reliability*

The reliability sub-objective summarises the schemes impact on the objective to improve journey time reliability for drivers, passengers and freight users. Reliability is defined as variation in journey times that drivers are unable to predict. Hence reliability is confined to random effects. It arises from either variability in recurrent congestion at the same period each day - Day to Day Variability (DTDV) or variability in non-recurrent congestion such as incidents. It excludes predictable variation relating to varying levels of demand by time of day, day of week, and seasonal effects which travellers are assumed to be aware of.

10.5 **Accessibility Objective**

Accessibility relates to improving access to facilities for those without access to a car and to reduce severance. Total accessibility benefits will be captured effectively by the user benefits included in a fully-specified and properly executed COBA. The accessibility objective is broken down into three sub-objectives within WebTAG, which seek to display certain aspects of total accessibility; however option values are not included in the assessment and so the following are examined in detail:

10.5.1 *Severance* – Measures the separation of residents from facilities and services which they use within their community and how this is affected by the proposals;

10.5.2 *Access to Transport System* – Strongly influenced by access to a private car and proximity to public transport; and how the schemes impact on this.

10.6 **Integration Objective**

The integration objective as per WebTAG included three sub-objectives and these are Transport Interchange; other Government Policies (which includes Social Exclusion and Economic Development) and Land-use Policy.

10.6.1 *Transport Interchange*

Improving interchange has been identified in the Government's White paper 'A New Deal for Transport' as a key factor in achieving integrated transport. This has been further sub-divided into passenger interchange and freight interchange within WebTAG. As freight interchange is more related to rail, it has therefore not been included in this assessment which focuses on passenger interchange which is described as follows;

- Passenger Interchange: Identify in broad terms the extent to which particular indicators could change following the implementation of the scheme, together with the number of passengers affected. It should include intermodal interchange between public transport modes and public and private modes.

10.6.2 *Land Use Policy*

This sub-objective summarises the assessments made of the extent to which the scheme is integrated with land use policies and transport policies. The appraisal includes the national, regional and strategic context of planning policies. This sub-objective has wider coverage in terms of transport policies and proposals to include all motorised and non-motorised modes (not just road based) and proposals by operators as well as those proposed by planners.

10.6.3 *Government Policies*

The impact of transport proposals on other appropriate Government Policies should be considered in order to assess the effect on overall policy integration within Government.

10.7**Summary Tables**

Summary tables for each route option in both sections are included in Appendix 1.

11 Conclusions and Recommendations

11.1 Introduction

This report has summarised a Stage 2 Scheme Appraisal for the improvement of the A6, between north of Claudy and east of Dungiven.

11.2 Conclusions and Recommendations

The following summarises the findings of the report for the two distinct sections, as per the analysis.

In Section 1 (Claudy to Dernaflaw) the preferred route option is the Red Route. Although it has the higher capital cost, it is wholly off line thus providing important benefits such as positive accident savings and business benefits and the most significant travel time savings which then outweighs the cost being £83million.

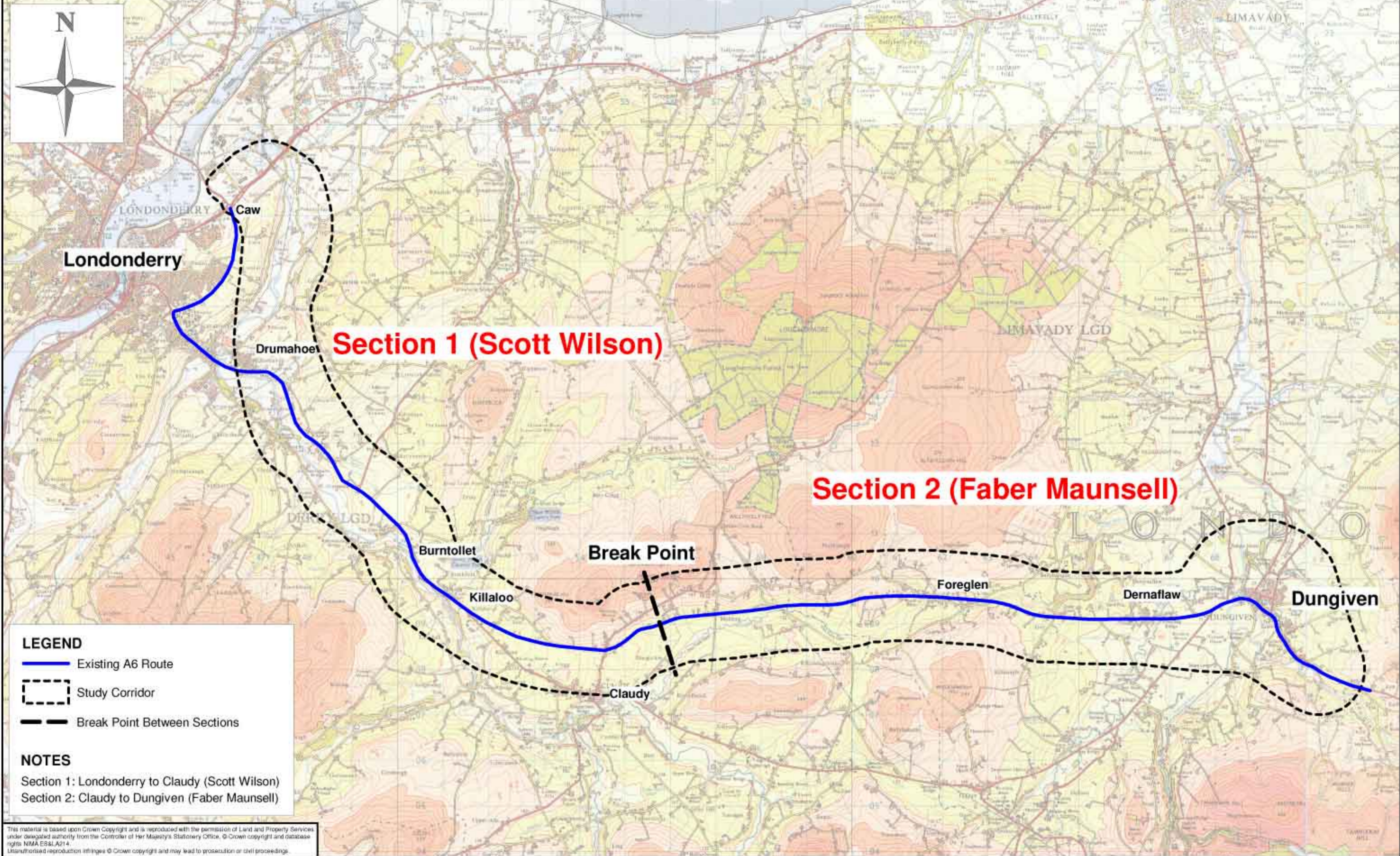
In Section 2 (Dungiven Bypass) the Cyan Route is the preferred route. The Cyan Route has the lower capital costs of the options and being offline, again provides important benefits such as having the cheapest construction costs at £74million, significant travel time saving benefits and the highest accident cost savings.

In terms of environment impact, there is an overall slight preference for the Red Route in Section 1 and the Cyan Route in Section 2.

In terms of economics, the Red Route and the Cyan Route, collectively provide the best BCR of 1.064, as calculated by COBA. This is considered to demonstrate that these route options provide value for money.

It is therefore recommended that the Red Route in Section 1 and the Cyan Route in Section 2 are adopted as the Claudy to Dungiven 'preferred route' and be taken forward for in-depth Stage 3 scheme assessment.

Figure 1 - Study Area



LEGEND

- Existing A6 Route
- Study Corridor
- Break Point Between Sections

NOTES

- Section 1: Londonderry to Claudy (Scott Wilson)
- Section 2: Claudy to Dungiven (Faber Maunsell)

This material is based upon Crown Copyright and is reproduced with the permission of Land and Property Services under delegated authority from the Controller of Her Majesty's Stationery Office. © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client: **ROADS Service**

Project: **55269 IBLE**
A6 CLAUDY TO DUNGIVEN

Title: **Stage 2 Appraisal**
Figure 1
Overview of A6 Dualling Scheme
Between Londonderry and Dungiven

FABER MAUNSELL | **AECOM**

24 Linenhall Street
Belfast
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: GB	MapInfo: GB
Chk'd: CD	App'd: JMcD
Date: 05/05/09	Scale: NTS
No. 552693528100301A	

Figure 2 - Index Drawing for all routes

Including:

Figure 2.1

Figure 2.2

Figure 2.3

Figure 2.4

Figure 2.5

Figure 2.6

Figure 2.7

Figure 2.8

Figure 2.9a

Figure 2.9b

Figure 2.10

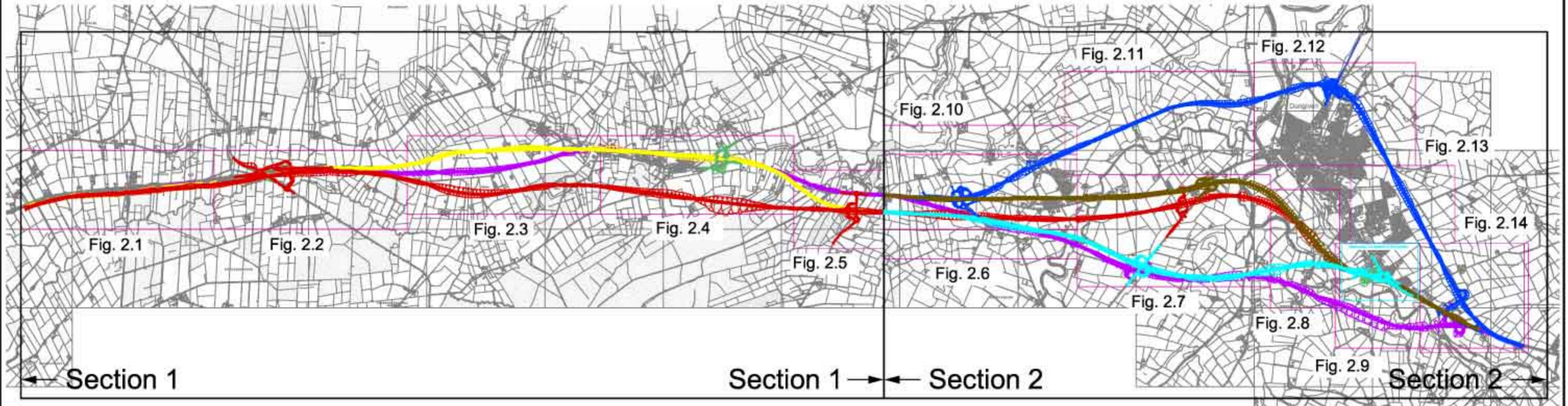
Figure 2.11

Figure 2.12

Figure 2.13

Figure 2.14

Showing enlarged route options and junctions



This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214
 Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings

Client:   

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
 Section 1 & 2 - Routes and Junctions
 (Index Drawing For Figures 2.1 - 2.14)
 Figure 2**

FABER MAUNSELL | AECOM

24 Linenhall Street
 BELFAST
 BT2 8BG

Tel: +44 (0) 28 9060 7200
 Fax: +44 (0) 28 9060 7399
 www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: N.T.S

No. 552693528100304E Rev: **F1**

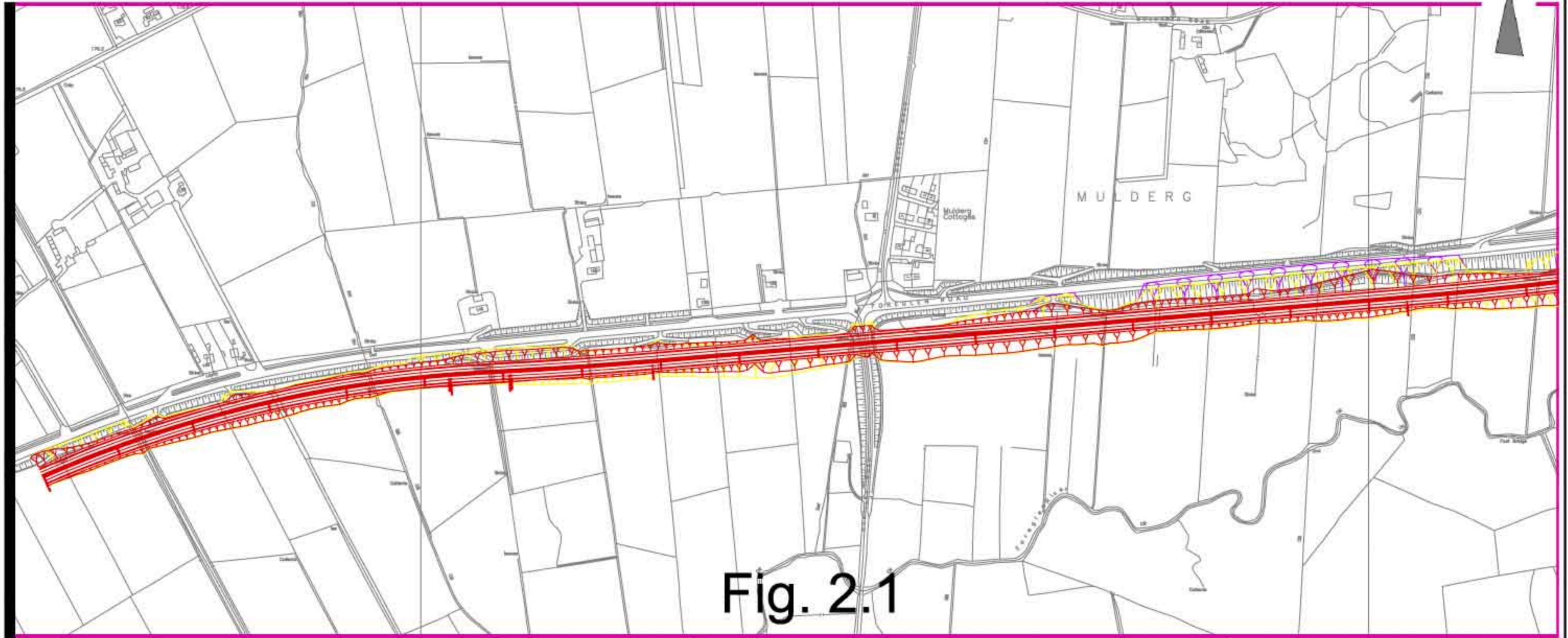


Fig. 2.1

NOTES

1. The Yellow, Red & Purple routes are overlapped

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:  An Agency within the Department for Regional Development
 

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 1 - Routes and Junctions
Figure 2.1**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: NC	CAD: AF	cm
Chk'd: CD	App'd: CD	
Date: APRIL 09	Scale: 1:5000	
No. 552693528100304F		Rev: F1
cm		A3

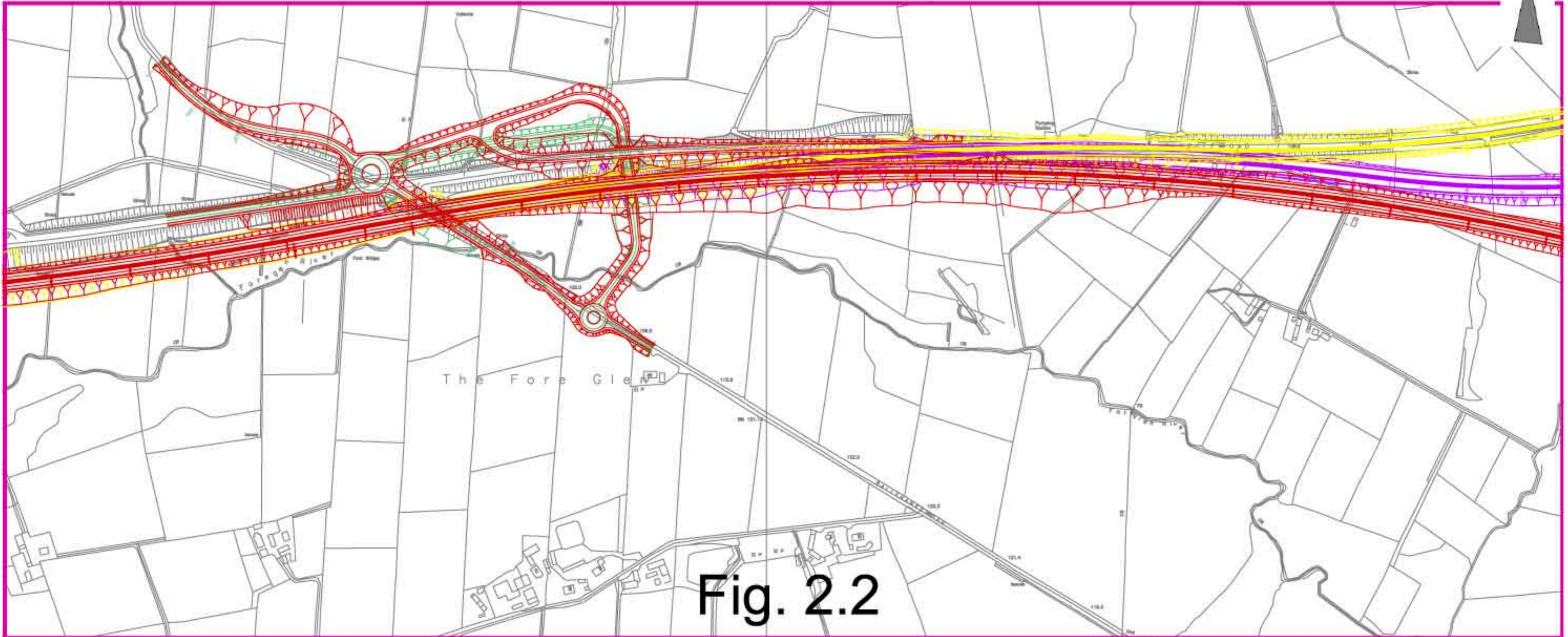


Fig. 2.2

NOTES

1. The Yellow and Purple routes are overlapped in certain locations
2. The junction shown in green is shared with more than one route option

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214
 Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings

Client:   

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
 Section 1 - Routes and Junctions
 Figure 2.2**

FABER MAUNSELL | AECOM

24 Linenhall Street
 BELFAST
 BT2 8BG

Tel: +44 (0) 28 9060 7200
 Fax: +44 (0) 28 9060 7399
 www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304G Rev: **F1**

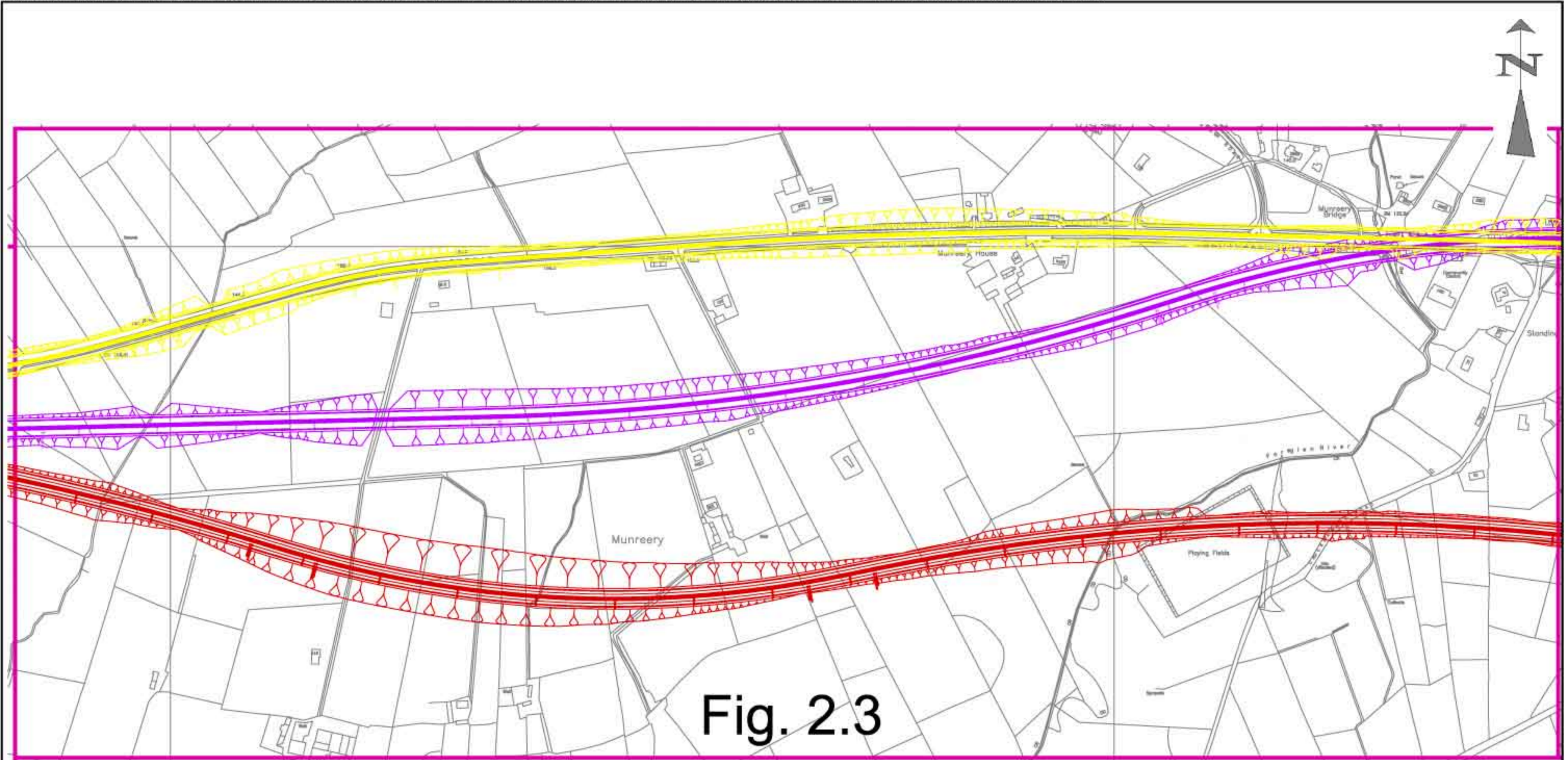


Fig. 2.3

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.



Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 1 - Routes and Junctions
Figure 2.3**

FABER MAUNSELL | AECOM
24 Linenhall Street
BELFAST
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

NOTES

1. The Yellow & Purple routes are overlapped in certain locations

Design: NC	CAD: AF	cm
Chk'd: CD	App'd: CD	
Date: APRIL 09	Scale: 1:5000	
No. 552693528100304H		Rev: F1
cm		A3

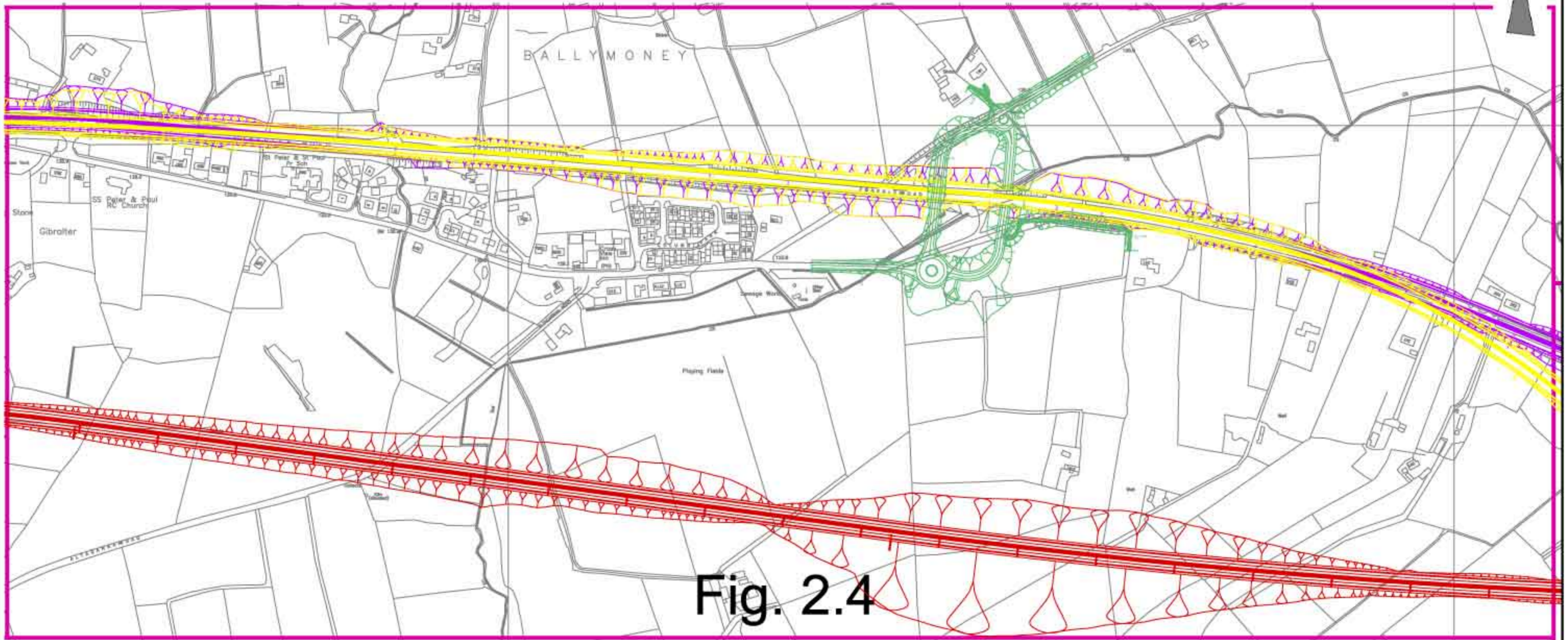


Fig. 2.4

NOTES

1. The Yellow & Purple routes are overlapped in certain locations
2. The junction coloured green is shared by more than one route option

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:   

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 1 - Routes and Junctions
Figure 2.4**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 5526935281003041 Rev: **F1**

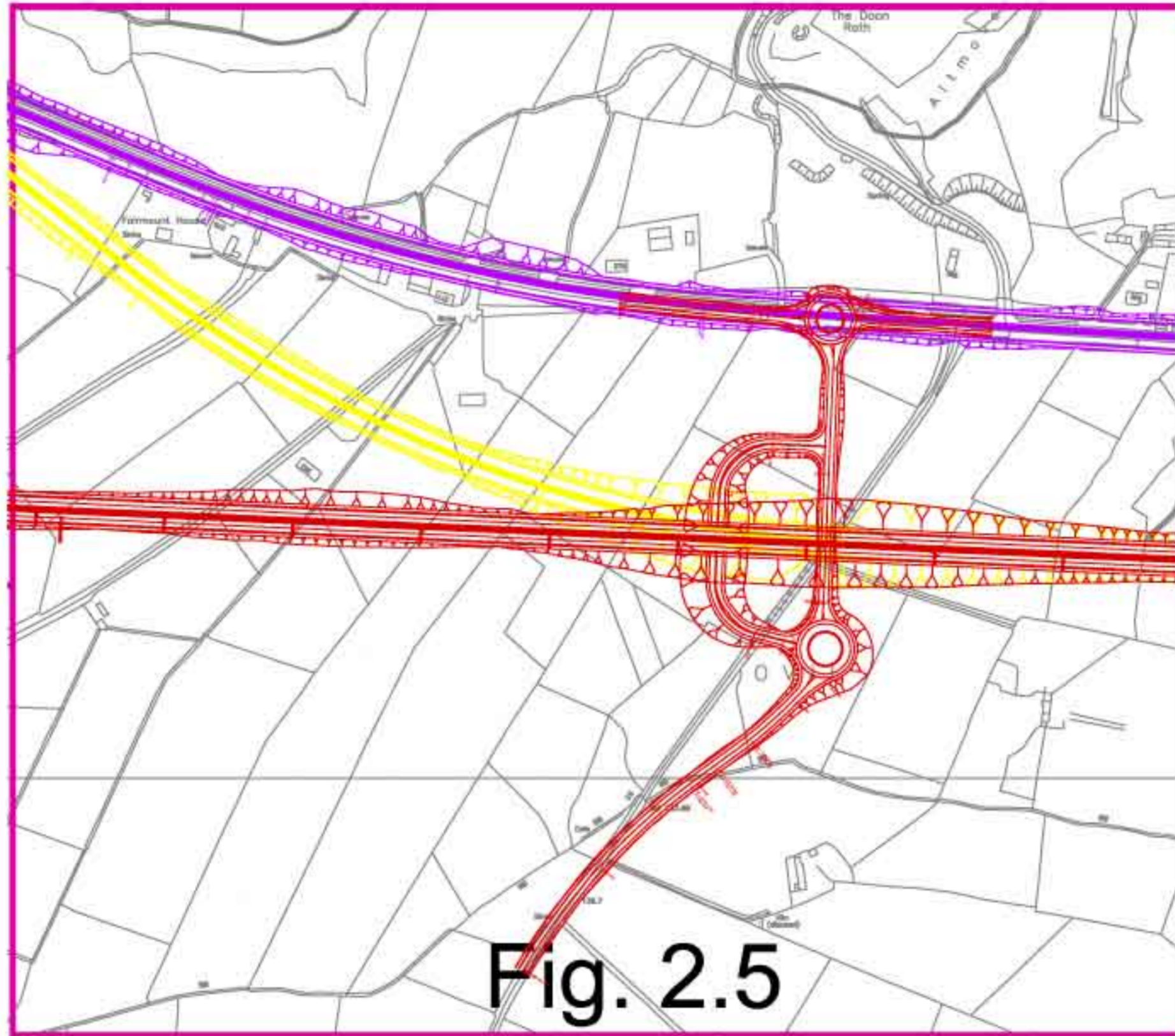


Fig. 2.5

NOTES

1. The Yellow & Red routes are overlapped in certain locations

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214
 Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings

Client:   

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
 Section 1 - Routes and Junctions
 Figure 2.5**

FABER MAUNSELL | AECOM

24 Linenhall Street
 BELFAST
 BT2 8BG

Tel: +44 (0) 28 9060 7200
 Fax: +44 (0) 28 9060 7399
 www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304J Rev: **F1**

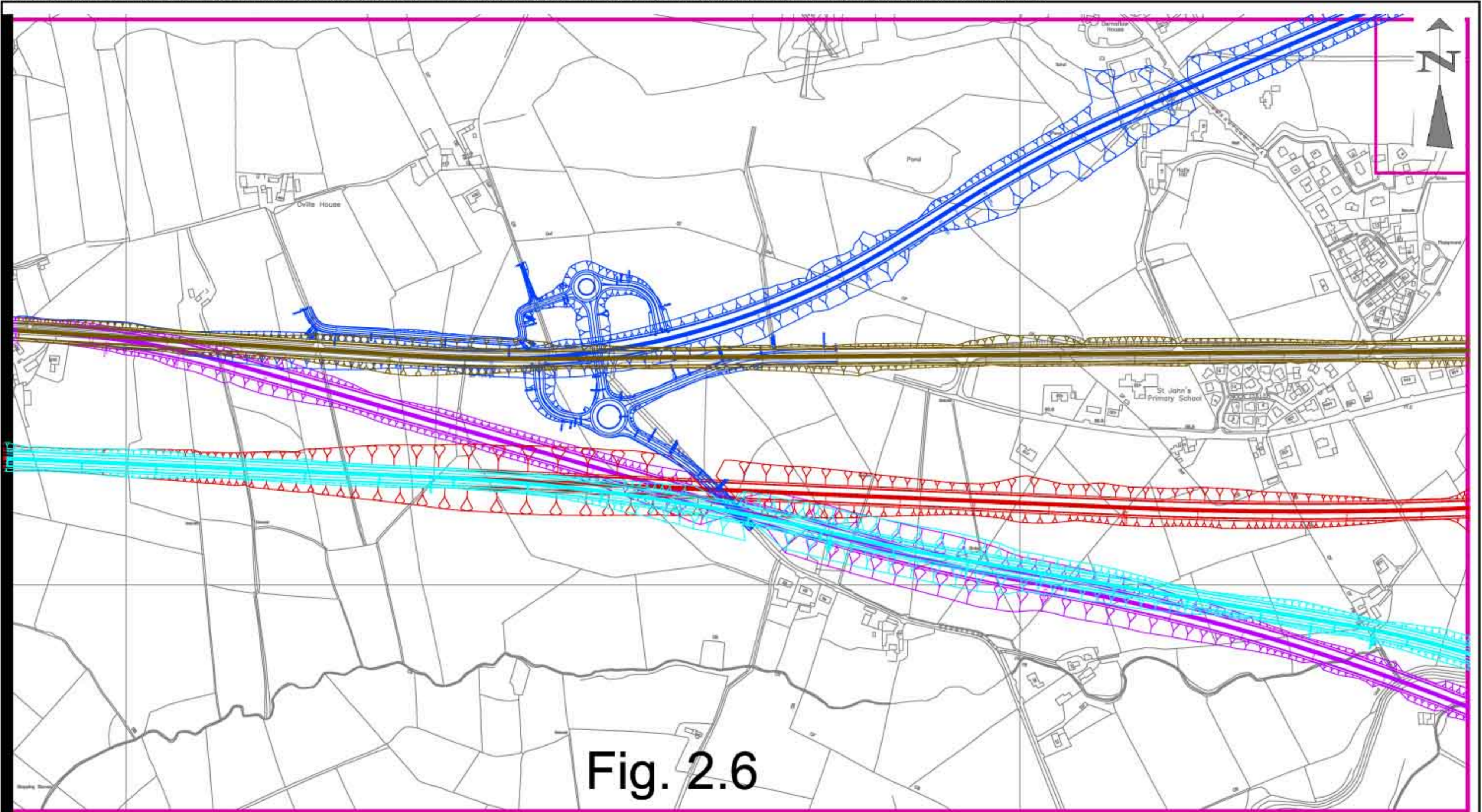


Fig. 2.6

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:   

Project: **A6 Cloudy to Dungiven**

Title: **Stage 2 Appraisal
Section 2 - Routes and Junctions
Southern Corridor
Figure 2.6**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

NOTES	
1. The routes Red, Purple & Cyan, Plus Purple & Brown are overlapped in certain locations	
Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000
No. 552693528100304K	
Rev: F1	
cm	A3

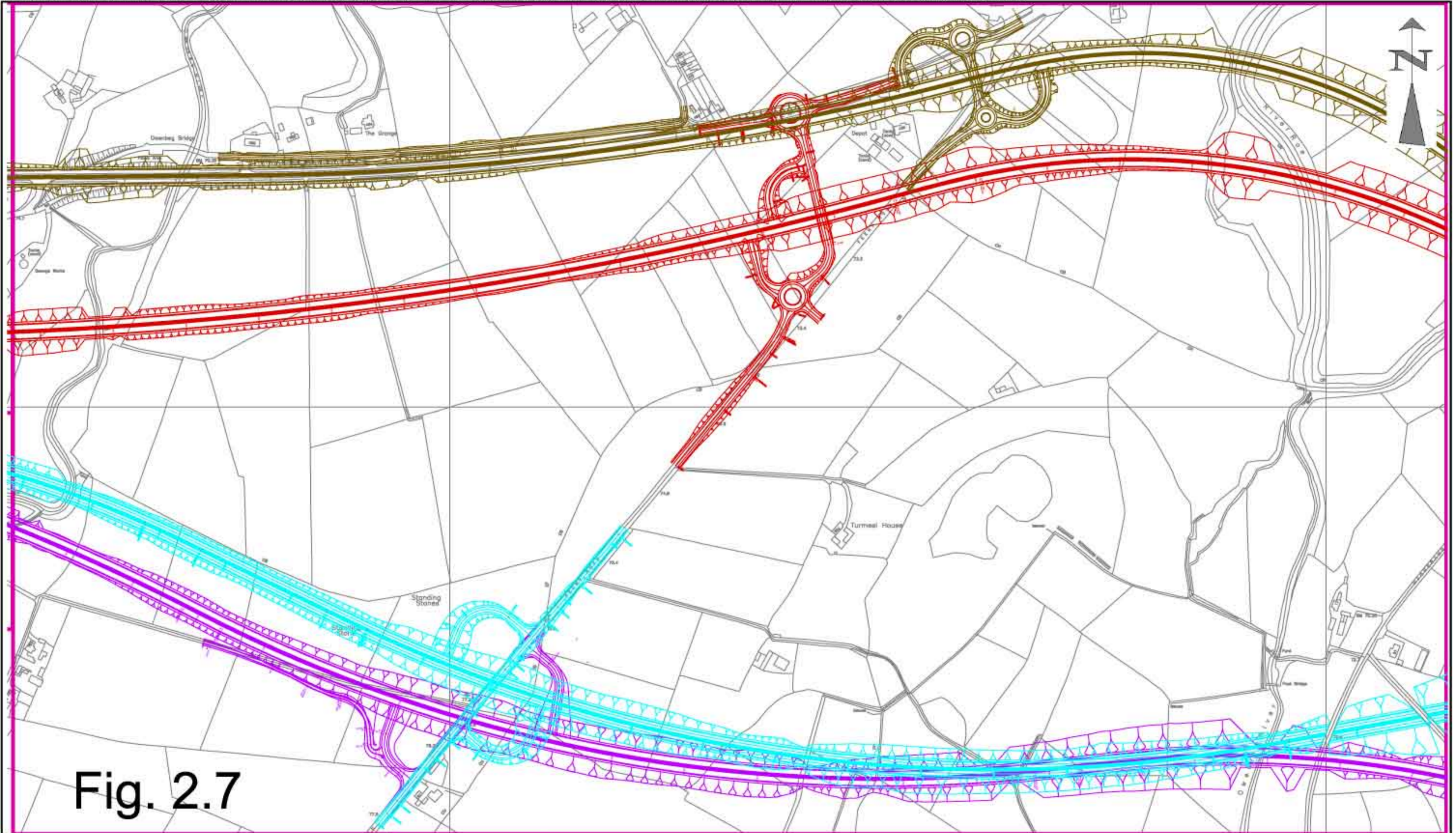


Fig. 2.7

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

NOTES

1. The Purple & Cyan routes are shown overlapped in certain locations

Client:   

Title: **Stage 2 Appraisal
Section 2 - Routes and Junctions
Southern Corridor
Figure 2.7**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

Project: **A6 Claudy to Dungiven**

No. 552693528100304L Rev: **F1**



NOTES

- 1. The Red & Brown routes are shown overlapped in certain locations

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:   

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 2 - Routes and Junctions
Southern Corridor
Figure 2.8**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304M Rev: **F1**

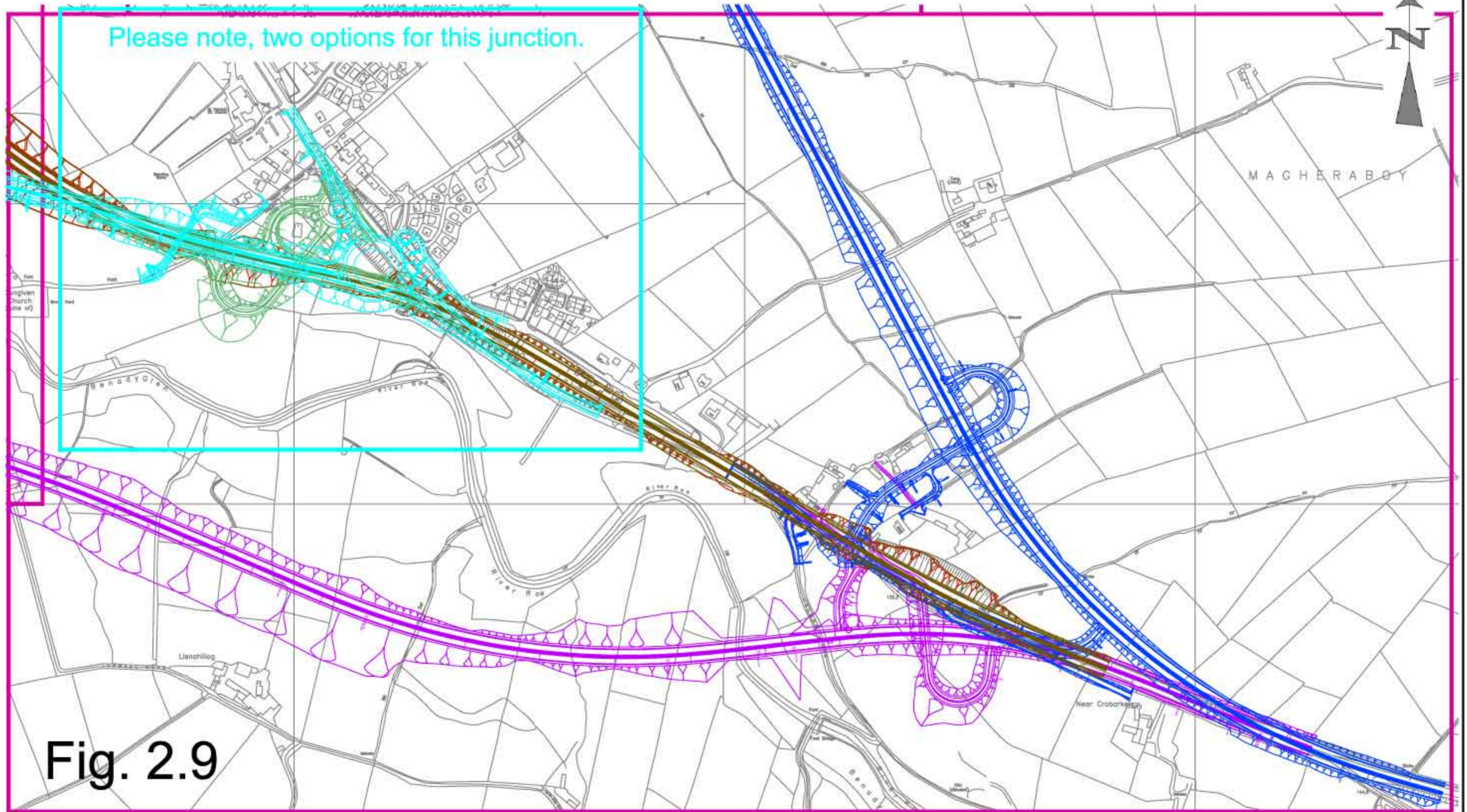


Fig. 2.9

NOTES

- 1. The Red, Brown & Purple routes are shown overlapped

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:  **ROADS Service** 

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 2 - Routes and Junctions
Southern Corridor
Figure 2.9a**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304Na Rev: **F1**

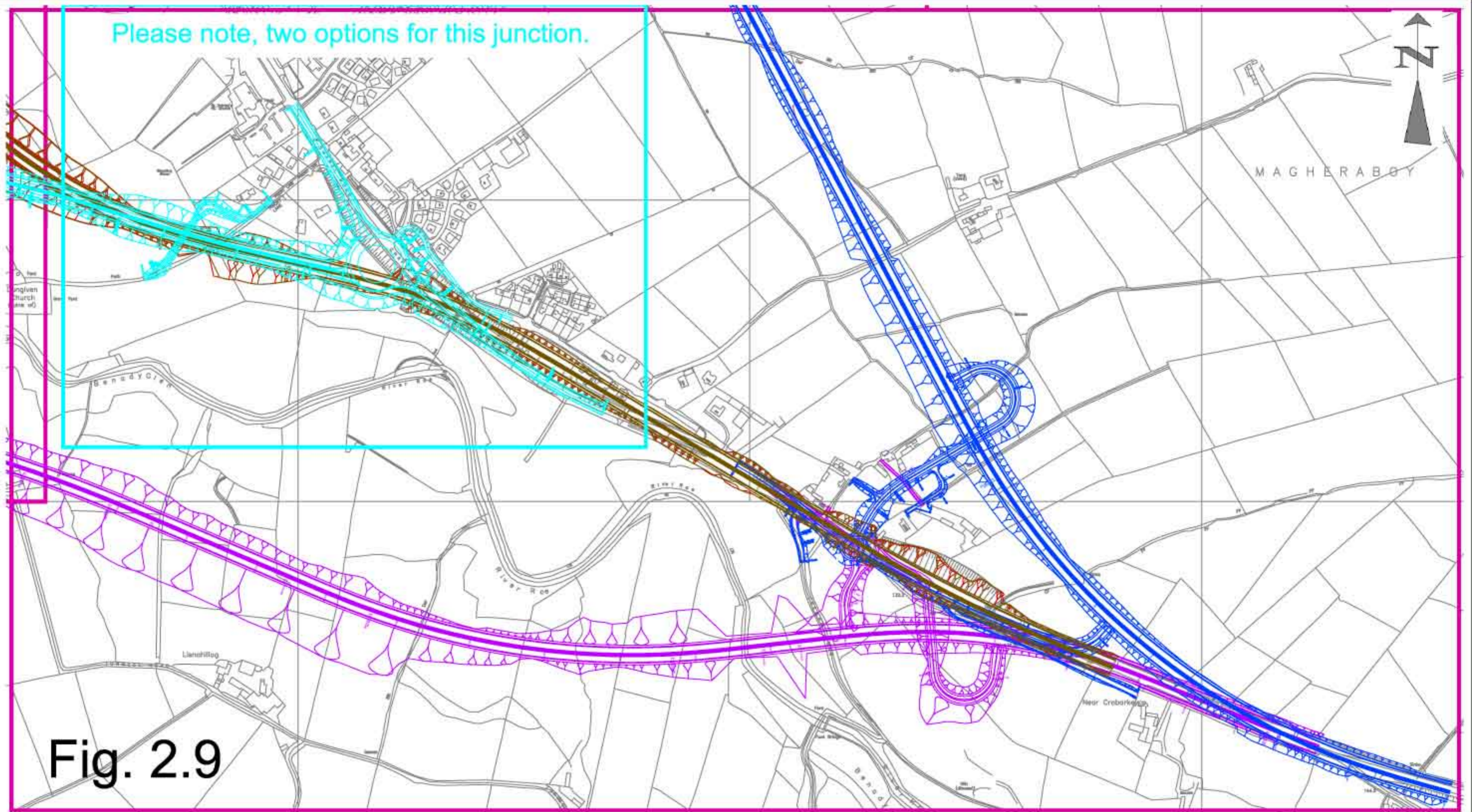


Fig. 2.9

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:  

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 2 - Routes and Junctions
Southern Corridor
Figure 2.9b**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

NOTES

1. The Red Brown & Cyan routes are shown overlapped in certain locations

Design: NC	CAD: AF	cm
Chk'd: CD	App'd: CD	
Date: APRIL 09	Scale: 1:5000	
No. 552693528100304Nb		Rev: F1
cm		A3

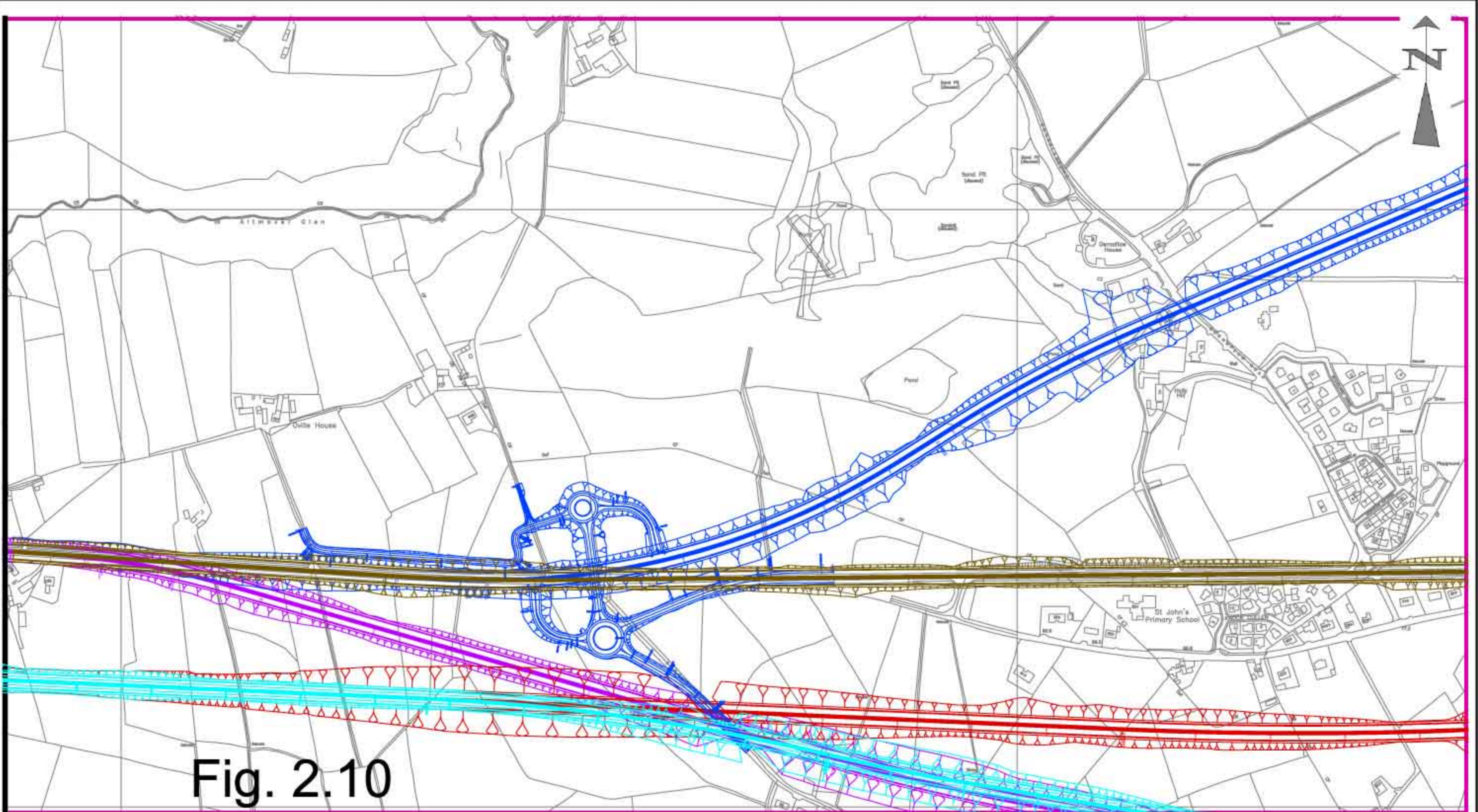


Fig. 2.10

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.



Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
Section 2 - Routes and Junctions
Northern Corridor
Figure 2.10**

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

NOTES

1. Route Blue shown only. For details of other section 2 routes see other drawings

Design: NC	CAD: AF	cm
Chk'd: CD	App'd: CD	
Date: APRIL 09	Scale: 1:5000	
No. 5526935281003040		Rev: F1
cm		A3

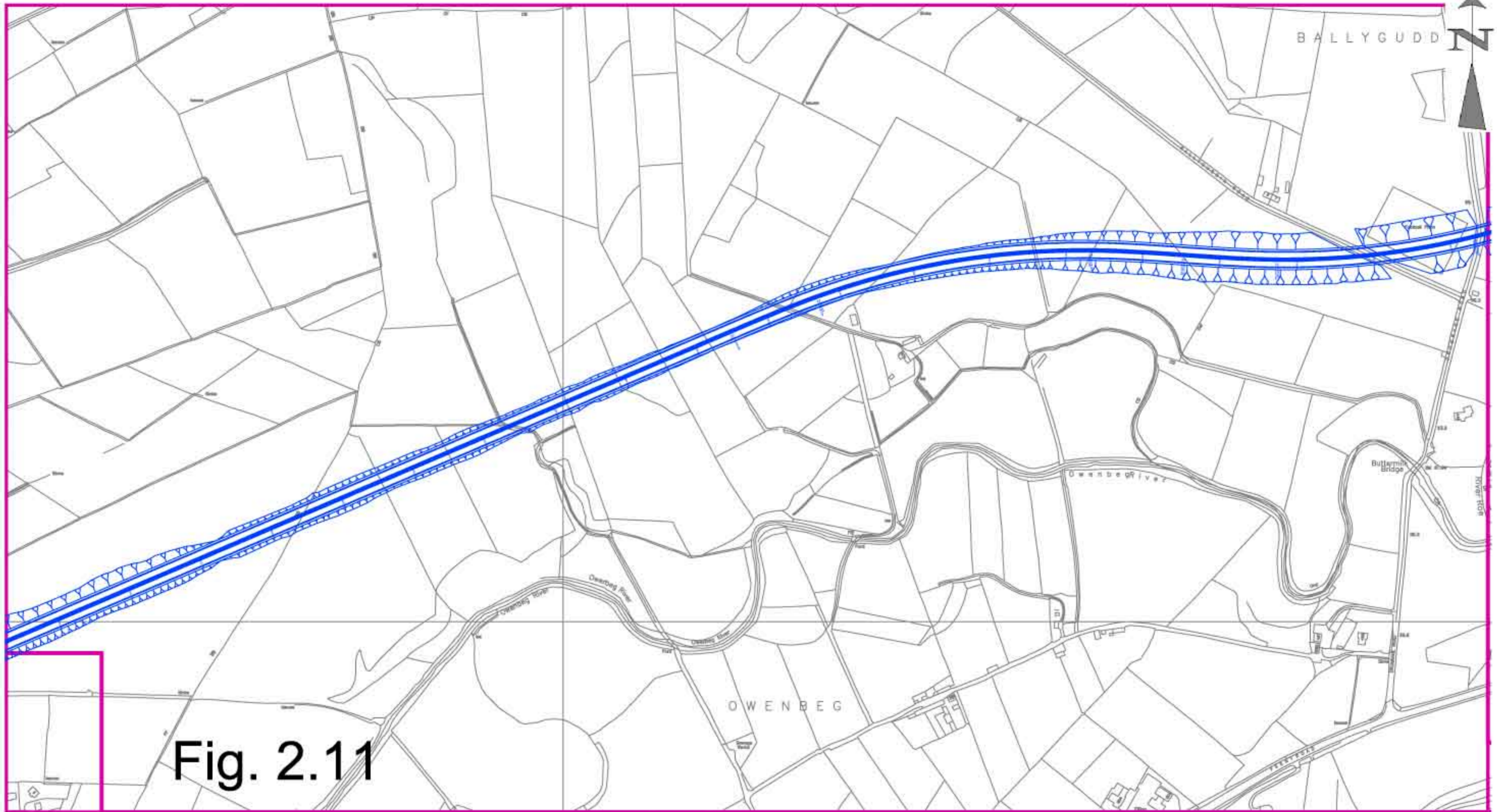


Fig. 2.11

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214. Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings.

Client:   

Project: A6 Claudy to Dungiven

Title: Stage 2 Appraisal
Section 2 - Routes and Junctions
Northern Corridor
Figure 2.11

FABER MAUNSELL | AECOM

24 Linenhall Street
BELFAST
BT2 8BG

Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304P Rev: F1

NOTES
1. Route Blue shown only. For details of other section 2 routes see other drawings

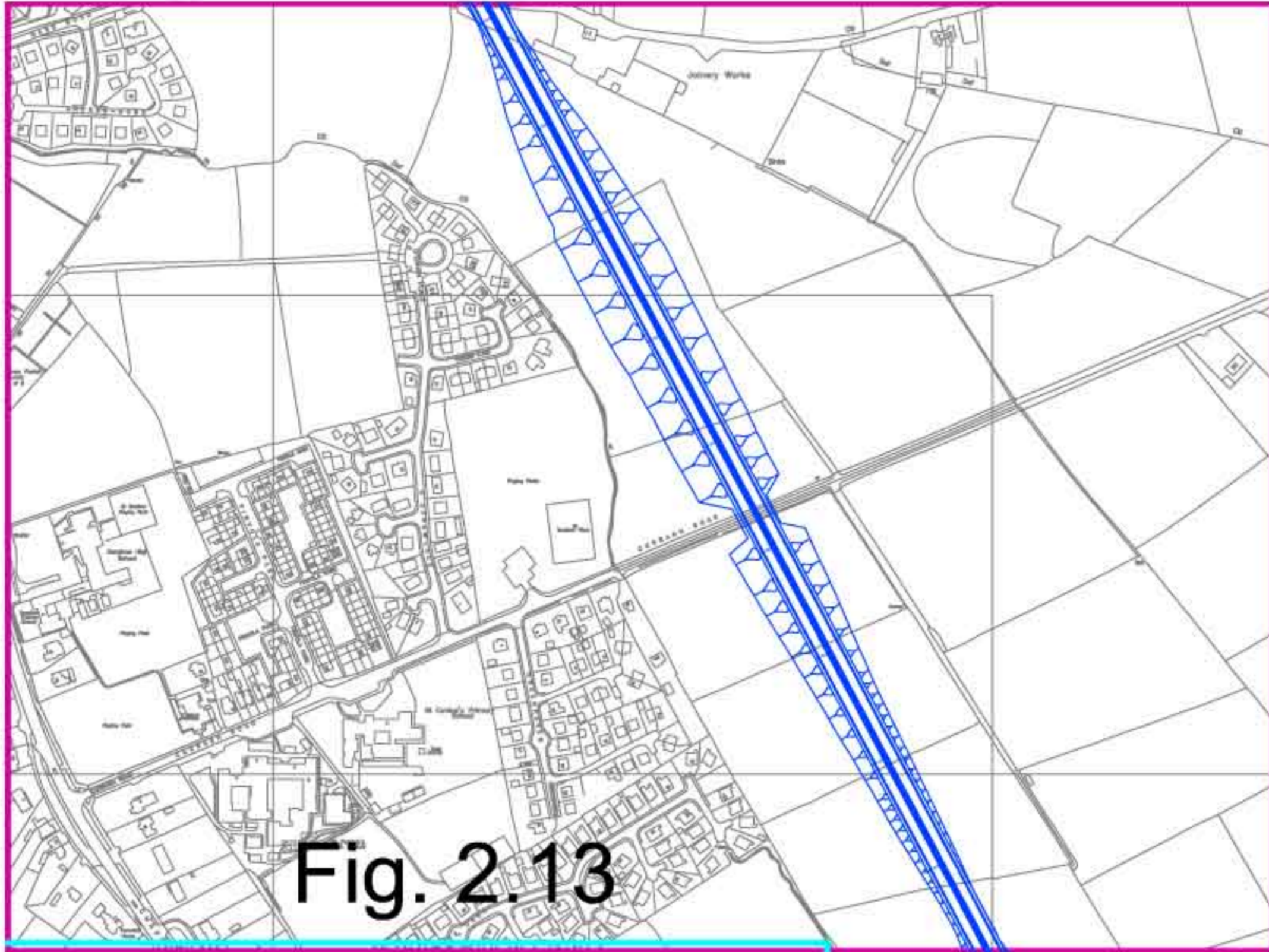


Fig. 2.13

NOTES

1. Route Blue shown only. For details of other section 2 routes see other drawings

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214
 Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings

Client:  

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
 Section 2 - Routes and Junctions
 Northern Corridor
 Figure 2.13**

FABER MAUNSELL | AECOM

24 Linenhall Street
 BELFAST
 BT2 8BG

Tel: +44 (0) 28 9060 7200
 Fax: +44 (0) 28 9060 7399
 www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304R Rev: **F1**

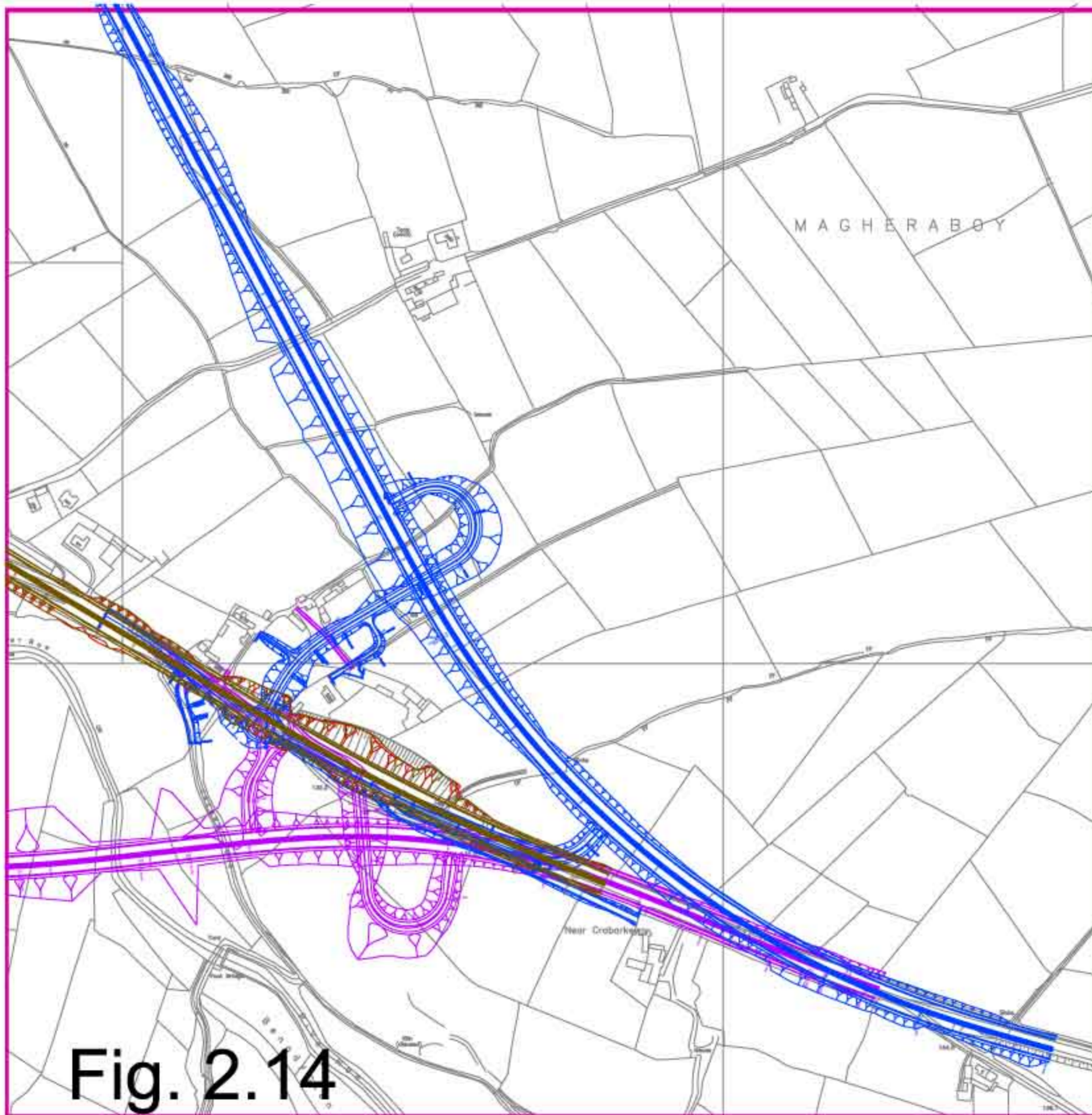


Fig. 2.14

NOTES

1. Route Blue shown only. For details of other section 2 routes see other drawings

This material is based upon Crown Copyright and is reproduced with permission of Land and Property Services under delegated authority from the controller of Her Majesty's Stationary Office, © Crown copyright and database rights NIMA ES&LA214
 Unauthorised reproduction infringes © Crown copyright and may lead to prosecution or civil proceedings

Client:   

Project: **A6 Claudy to Dungiven**

Title: **Stage 2 Appraisal
 Section 2 - Routes and Junctions
 Northern Corridor
 Figure 2.14**

FABER MAUNSELL | AECOM

24 Linenhall Street
 BELFAST
 BT2 8BG

Tel: +44 (0) 28 9060 7200
 Fax: +44 (0) 28 9060 7399
 www.fabermaunsell.com

Design: NC	CAD: AF
Chk'd: CD	App'd: CD
Date: APRIL 09	Scale: 1:5000

No. 552693528100304S Rev: **F1**



Appendix 1 - Summary Tables

Option – Purple Section 1		Description- The Purple Route has an identical alignment to the Red Route up to the point where the Red Route diverts offline to the east of Ballyhanedin Road at Munreery. The Purple Route diverts to the south of the existing alignment for 2 km some 200 metres south of the existing road, rejoining the existing alignment near Munreery Bridge and then continues online past Foreglen, through the proposed Altagarran and Altmoer Road junction to the end of Section 1.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £78.197m																																																							
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options.</p> <p>Overall the yellow option results in an improvement in air quality with regard to PM₁₀ concentrations in 2016; The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p>	<p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Purple</td> <td>-980.6</td> <td>-178.3</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td>Do Minimum</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td>2016 Do Something (% relative to 2016 Do Minimum)</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Purple</td> <td>76</td> <td>2%</td> <td>12</td> <td>1%</td> <td>67</td> <td>6%</td> <td>1.7</td> <td>7%</td> <td>7522</td> <td>7%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Purple	-980.6	-178.3		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Purple	76	2%	12	1%	67	6%	1.7	7%	7522	7%	<p>Local Air Quality - Major Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Purple	-980.6	-178.3																																																								
	CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																						
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Purple	76	2%	12	1%	67	6%	1.7	7%	7522	7%																																																	
Cultural Heritage	<p>The Purple Route impacts upon ten archaeological sites including direct physical impacts upon archaeological and historic landscape features and visual impacts upon the setting of a listed building, a standing stone and a flax mill.</p> <p>The removal of a number of features will have an adverse impact upon the complexity of the archaeology of the area. Several sites would be damaged or removed and therefore there would be an adverse impact upon the period of these sites.</p>	<p>The Purple Route impacts upon 10 archaeological sites; 7 of these impacts are direct physical impacts upon archaeological and historic landscape features and 3 comprise visual impacts upon the setting of a listed building, a standing stone and a flax mill.</p>	Moderate Adverse																																																								
Disruption due to Construction	<p>The Purple Route passes within 100 m of the three sensitive properties including the church, school and community centre in Foreglen and will involve exposure of premises to the noise and dust associated with construction processes.</p> <p>This option is likely to have a severe impact on the existing road network as it is the option that influences a number of properties and access to these properties.</p> <p>Provision of temporary crossing points for pedestrians and cyclists, is of particular importance as the Purple Route passes through the middle of Foreglen, severing residents from community facilities such as the church, and crossing the NCN Route 93. Bus journey routes and bus stops may be affected along the existing A6 during the proposed works.</p> <p>The Purple Route may impact on local wildlife through disturbance, mostly caused by noise, vibration and visual disturbance.</p>	<p>The proposed works for the construction phase of the Purple Route will be within 100 m of 138 properties in total. Of these properties, approximately 123 fall within the vicinity of Foreglen, and approximately 15 properties fall within the section between Claudy and the west of Foreglen.</p> <p>The Purple Route passes within 100 m of the three sensitive properties including the church, school and community centre in Foreglen.</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the Foreglen River and Wood Burn. Both rivers are classified as salmonid under the Freshwater Fish Directive. The adverse effect on salmon populations in the Wood Burn is rated as lower because the crossing is near the headwaters of the river.</p> <p>Additional impacts of the proposed route will be on improved, semi-improved and arable farmland. Short lengths of the route will impact upon sites that are of greater biodiversity interest.</p>	N/A	Slight Adverse																																																								

The scheme would impact upon a small area of species-rich marshy grassland. Hedgerows that will be affected by the works are of low botanical interest, but record historical continuity of the local field pattern.

Although no evidence of otters was found in the limited survey carried out to date in the immediate vicinity of the Route, it is clear that the species is present within the Faughan catchment and it is likely that the Foreglen River and the Wood Burn are both used by otters to

Option – Purple Section 1		Description- The Purple Route has an identical alignment to the Red Route up to the point where the Red Route diverts offline to the east of Ballyhanedin Road at Munreery. The Purple Route diverts to the south of the existing alignment for 2 km some 200 metres south of the existing road, rejoining the existing alignment near Munreery Bridge and then continues online past Foreglen, through the proposed Altagarran and Altmoover Road junction to the end of Section 1.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £78.197m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		<p>an unknown extent. Potential impacts on the species include disturbance to breeding and feeding activities, adverse effects on prey species through disturbance and pollution of the river waters, and increased mortality due to diversion of dispersing or hunting animals across roads as a result of works activities.</p> <p>A dedicated badger survey is ongoing, but it is known that badgers occur in the general vicinity of the Route.</p> <p>A dedicated bat survey has yet to be carried out, but it is assumed at this stage that bats are present.</p>												
	Landscape Effects	<p>Impacts would be largely the same as the Yellow Route, except for the off line section at Munreery. This section traverses a small upland to the immediate south of the existing A6, still within the area comprised primarily of development associated with the A6 and Foreglen.</p> <p>In comparison with the yellow route the purple route is less attractive in that its offline section increases the extent of build development and thereby detracts from what rural landscape remains in the immediate environs of Foreglen.</p>	N/A	Minor Adverse										
	Land Use	<p>The Purple Route will result in a loss of community land arising from encroachment on existing community facilities in Foreglen.</p> <p>Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.</p>	<p>The Purple Route will result in 14 required demolitions, with 6 residential, 6 commercial and 2 other demolition. Purple Route will result in a small community land take (308m²) and will result in the loss of 4269 m² of development land. The Purple Route does not impact on land which is considered BMV land, however it will affect 34 landowners.</p>	Minor Adverse										
	Noise and Vibration	<p>In terms of vibration the Purple Route will result in a reduction for several properties potentially affected by vibration. Few properties will experience an increase in vibration.</p> <p>The Purple route results in an area adversely affected by noise.</p> <p>Additionally there is a significant area that will experience noise reductions of at least 1dB or more.</p>	<p>Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option L_{A10} versus Do-Minimum L_{A10})</p> <table border="1"> <thead> <tr> <th></th> <th>Number of Residential Properties</th> </tr> </thead> <tbody> <tr> <td>Significance of Impact</td> <td>Purple Route Option</td> </tr> <tr> <td>Slight/ Moderate Adverse or worse</td> <td>74</td> </tr> <tr> <td>Slight/ Moderate Beneficial or Better</td> <td>126</td> </tr> <tr> <td>Ratio of 1dB or More Changes</td> <td>1.7</td> </tr> </tbody> </table>		Number of Residential Properties	Significance of Impact	Purple Route Option	Slight/ Moderate Adverse or worse	74	Slight/ Moderate Beneficial or Better	126	Ratio of 1dB or More Changes	1.7	Slight Beneficial
	Number of Residential Properties													
Significance of Impact	Purple Route Option													
Slight/ Moderate Adverse or worse	74													
Slight/ Moderate Beneficial or Better	126													
Ratio of 1dB or More Changes	1.7													
	Pedestrians, Cyclists, Equestrians and Community Effects	<p>No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the surveys undertaken indicated that most NMU journeys will be in the vicinity of a proposed junction and therefore a minimal journey length change is expected</p> <p>There will be a slight increase in journey length, however it is unlikely to deter people from continuing as an NMU.</p> <p>This option is likely to improve the safety or amenity value for NMUs, if NMU facilities are included on the proposed Ballyhanedin Road junction. However, along the remainder of the route in this area, NMU movements will be confined to the existing A6, as pedestrian access will be severely limited to the proposed A6 dualling schemes. This option is mostly online and so amenity may not change significantly, except that better road furniture would be expected to improve safety for people along the road edge.</p>	N/A	Moderate Adverse										
	Vehicle Travellers	<p>For the Purple Route views will generally range from intermittent to open. Views from the road around Foreglen will remain the same and as the route dips offline at a point where the existing A6 has good views, no change will be expected. The views for the offline section range from intermittent to open depending on roadside hedgerows and trees. The view from road for the junctions at Ballyhanedin Road and Altmoover Road will remain intermittent / open with views of open space, hills and agricultural land. However, the bridges proposed as part of these junctions are likely to restrict the existing views.</p>	N/A.	Large Beneficial										

Option – Purple Section 1		Description- The Purple Route has an identical alignment to the Red Route up to the point where the Red Route diverts offline to the east of Ballyhanedin Road at Munreery. The Purple Route diverts to the south of the existing alignment for 2 km some 200 metres south of the existing road, rejoining the existing alignment near Munreery Bridge and then continues online past Foreglen, through the proposed Altagarran and Altmover Road junction to the end of Section 1.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £78.197m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		<p>The Purple Route will result in moderate levels of frustration for vehicle travellers. Frustration associated with high traffic volumes, congestion and vehicles accessing and egressing from the existing junctions will be reduced, as the new junctions should allow more efficient traffic movement.</p> <p>The proposed Altmover Road junction will reduce fear of accidents. However, factors increasing the fear of potential accidents will be parked cars, pedestrians and vulnerable road users where the proposed route passes through Foreglen. The fear of accidents as a result of this proposed option will be reduced compared to the existing alignment, but would remain low to moderate.</p>																											
	Road Drainage and the Water Environment	<p>During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. The same impacts are predicted to be insignificant for minor watercourses. During the operation phase however, there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities. Surface water impacts will need to be considered in the development of proposals for bridging watercourses and in the development of treatment proposals at the detailed design stage.</p> <p>There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant.</p> <p>With regards to flood risk, construction impacts range between low adverse significance and insignificant. Low adverse significant impacts may occur to the unnamed tributaries of Foreglen River and Wood Burn due to the potential for blockages to occur, and to Foreglen River as a result of an increase in flood risk. During operation there is the potential for highly significant adverse impacts to the River Foreglen due to afflux, and significant adverse impacts to Wood Burn also from afflux. The remaining impacts are considered to be low adverse to insignificant.</p>	N/A	Moderate Adverse																									
	Geology and Soils	<p>The route lies within 100 m of contaminated land site, a former petrol station / fuel storage area, with a potential for release of hydrocarbons from contaminated soils as a result of disturbance during construction.</p> <p>The route is adjacent to contaminated land site, described as reclaimed land, now mainly occupied by a dwelling and associated gardens. Disturbance of the site has the potential to release any entrained contaminants into the environment, but is unlikely to present a significant risk to construction.</p>	There are 0 fields infested with PWD or PCN along the route corridor.	Slight Adverse																									
	Impact of Road Schemes on Policies and Plans	<p>The Purple Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012. The route will improve passenger journeys and freight transport links between Belfast and Londonderry.</p> <p>The Purple Route will allow better and safer access and egress from minor roads such as Ballyhanedin Road and Altmover Road onto the A6. However, it is a predominately online option and as a result is not likely to improve crossing facilities at Foreglen.</p>	<p>Effect of the Proposed Purple Route on Policies and Plans.</p> <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>6</td> <td>4</td> <td>4</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>36</td> <td>41</td> <td>11</td> <td>1</td> </tr> <tr> <td>Local</td> <td>3</td> <td>25</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total</td> <td>45</td> <td>70</td> <td>15</td> <td>1</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	6	4	4	0	Regional	36	41	11	1	Local	3	25	0	0	Total	45	70	15	1	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	6	4	4	0																									
Regional	36	41	11	1																									
Local	3	25	0	0																									
Total	45	70	15	1																									
SAFETY	Accidents	The majority of this option is off line dual carriageway and as such will provide safety benefits, because of its improved standard of the road and the separation of strategic and local traffic.	<p>Total Number of Link and Junction Accidents: 277.9</p> <p>Number of Link and Junction Fatalities: 19.7</p> <p>Number of Link and Junction Serious: 98.3</p> <p>Number of Link and Junction Slight: 383.0</p>	Accidents PVB: £26.709m																									
Economy	Transport Economic Efficiency	<p>The PVB represents the reduction in user costs that would result from the construction of the Do Something scheme. The TEE table shows negative net dis-benefits for consumer, business and private sector users and emissions. Their cumulative dis-benefit is -£3.414m. However Accident benefits give a positive result of £26.709m. This results in an overall value of benefits as £23.294m.</p>	<p>Total Link Vehicle Hours:</p> <p>Do Min Total Link Vehicle Hours: 42.801</p> <p>Do Something Total Link Vehicle Hours: 40,064</p> <p>Total Link Vehicle Hours Saved 2,737</p>	<p>TEE Table Consumer PVB: -£1.717m</p> <p>Business PVB: -£0.143m</p> <p>Private PVB:</p>																									

Option – Purple Section 1		Description- The Purple Route has an identical alignment to the Red Route up to the point where the Red Route diverts offline to the east of Ballyhanedin Road at Munreery. The Purple Route diverts to the south of the existing alignment for 2 km some 200 metres south of the existing road, rejoining the existing alignment near Munreery Bridge and then continues online past Foreglen, through the proposed Altagarran and Altmoer Road junction to the end of Section 1.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.			Present Value of Costs £78.197m	
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT			ASSESSMENT	
						-£0.354m Emissions PVB: -£1.200m Operating PVC: -£9.062m Investment PVC: £65.660m	
	Reliability	The purple route is for the majority on line dualling incorporating the new grade separated junction at Ballyhanedin Road and Altmoer road which will improve journey time reliability for drivers, passengers and freight.	N/A			Slight Beneficial	
ACCESSIBILITY	Community Severance	Between Claudy and Foreglen, there are only a few dwellings, on both the north and south side of the road. There are no notable community facilities on either side of the existing road and there is currently no severance of communities within this area. As the Purple Route is predicted to carry approximately 16,000 vehicles per day (AADT), according to the DMRB, this option would be designated a 'moderate' severance. However, as this option will involve online widening, and will impact on community facilities, this increases severance to 'severe'. It is likely that people would be deterred from making trips on foot to the community facilities on the other side of the road, and may even re-organise their habits by choosing to drive their children to school, for example, as it may be safer. This may lead to a change in the location of centres of activity, or people may find it easier to drive into Dungiven, for example, to go to the shops or the post office.	Approx; 4 community facilities may be affected			Large Adverse	
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed route.	N/A			Slight Beneficial	
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A			Neutral	
	Land Use Planning	There is no notable loss of zoned land. Identification of several areas of constraint on mineral developments in Section 1 of the proposed scheme.	N/A			Slight adverse	
	Other Government Policies (Social Inclusion and Local Economic Development)	In terms of social inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times.	N/A			Moderate Beneficial	
Overall Economic Assessment including Accident Benefits			Central Growth	PVC £56.598 M	PVB £23.294 M	NPV -£33.304 M	BCR 0.412

Option – Red Section 1		Description- The Red Route commences to the east of the settlement of Claudy. It lies directly south of the current alignment from the start of Section 1 until it passes east of Ballyhanedin Road junction. At this point the Red Route diverts offline to the south of the existing A6, passing to the south of the town of Foreglen. This route remains offline to the end of Section 1 and would tie in with two of new junctions, namely the grade separated junction at Ballyhanedin Road and the proposed junction at Killunaught Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £83.163m																																																							
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options.</p> <p>Major beneficial impacts were predicted for the Red Route for NO₂.</p> <p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead. Of the routes considered the greatest adverse impact was predicted for the Red Route.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead. The greatest adverse impact was predicted for the Red Route.</p>	<p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>-1073.8</td> <td>-201.1</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td>Do Minimum</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Red</td> <td>76</td> <td>2%</td> <td>12</td> <td>2%</td> <td>68</td> <td>8%</td> <td>1.7</td> <td>10%</td> <td>7638</td> <td>8%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Red	-1073.8	-201.1		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Red	76	2%	12	2%	68	8%	1.7	10%	7638	8%	<p>Local Air Quality – Minor Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Red	-1073.8	-201.1																																																								
	CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																						
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Red	76	2%	12	2%	68	8%	1.7	10%	7638	8%																																																	
Cultural Heritage	<p>The Claudy to Dernaflaw Red Route option impacts upon 12 archaeological sites. The proposed route is largely off-line and therefore there is an increased possibility of discovery of previously unrecorded archaeological sites.</p> <p>It is considered that the overall significance of effect of this route on the archaeological and cultural heritage resource is slight adverse.</p>	<p>The Red Route will impact upon 12 archaeological sites; 10 of these impacts are direct physical impacts upon archaeological and historic landscape features and 2 comprises visual impacts upon the setting of a flax mill and a possible earthwork.</p>	Slight Adverse																																																								
Disruption due to Construction	<p>The majority of properties affected, including residential, farmsteads and businesses, fall within the section between Claudy and the west of Foreglen where the route is on-line. This option will involve exposure of these properties to the noise and dust associated with construction processes.</p> <p>Of all the options in Section 1, the Red Route lies furthest from the line of the present A6, mainly passing through open countryside and affecting markedly fewer properties than any other option. The Red Route may require the demolition of a single property, and will adversely affect the access to a further dwelling. This route also passes through a sports pitch which forms an important community facility.</p> <p>The potential impact on protected sites and ecology is greater for the Red Route within Section 1 as it will sever the Ovil SLNCI.</p> <p>The Red Route may impact on local wildlife.</p> <p>Within the Foreglen area, the Red Route would result in minimal disruption to the travelling public by maintaining free-flowing traffic on the existing line of the A6 throughout the construction period. Effects on bus journeys and bus stops would be minimised during the construction works as traffic would remain on the existing A6. As the Red Route requires the shortest length of work adjacent to the existing A6, it is likely to have the least significant impact on the existing road network.</p>	<p>The Red Route passes within 100 m of 25 residential premises.</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the Foreglen River and Wood Burn. Both rivers are classified as salmonid under the Freshwater Fish Directive. The adverse effect on salmon populations in the Wood Burn is rated as lower because the crossing is near the headwaters of the river.</p> <p>Additional impacts of the proposed route will be on improved semi-improved and arable farmland, none of which is of high botanical interest. Short lengths of the route will impact upon sites that are of greater biodiversity interest.</p> <p>The scheme would impact upon a small area of species-rich marshy grassland. Hedgerows that will be affected by the works are of low botanical interest, but record historical continuity of the local field pattern.</p>	N/A	Moderate Adverse																																																								

Option – Red Section 1		Description- The Red Route commences to the east of the settlement of Claudy. It lies directly south of the current alignment from the start of Section 1 until it passes east of Ballyhanedin Road junction. At this point the Red Route diverts offline to the south of the existing A6, passing to the south of the town of Foreglen. This route remains offline to the end of Section 1 and would tie in with two of new junctions, namely the grade separated junction at Ballyhanedin Road and the proposed junction at Killunaught Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £83.163m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		The route crosses an extensive wetland of conservation value to the south of Foreglen, and will result in loss of heathland habitat, a Northern Ireland HAP habitat, on the lower slopes of Mullaghmeash Hill. Mammal surveys have yet to be completed along the route, but it is likely that otters, badgers and bats all occur within the route corridor.												
	Landscape Effects	The Red Route diverts offline to the south avoiding the main settlement of Foreglen and crosses the Foreglen Valley. This is determined to be a Good Quality Landscape. The route requires deep cuttings and embankments along almost the entire the length of the route after its divergence from the online options, with a particularly notable cutting at the eastern end at Mullaghmeash Hill. Transversing the Foreglen valley almost in a longitudinal diagonal would create a change of high magnitude, causing a major adverse impact on a largely unspoilt upland rural landscape.	N/A	Moderate Adverse										
	Land Use	The Red Route will require the least number of total demolitions and in the smallest loss of gardens and parking areas of the options considered. The Red Route will not result in the loss of community land and will result in the smallest loss of development land. In terms of the impact on agricultural land, there is no BMV land in Section 1; however there will be impacts to farmers associated with severance and access to fields.	The red route will result in 2 residential demolitions, 4 commercial, 2 other demolition, and 0 industrial demolitions. The red route will encroach upon 1949m ² of residential land. The Red Route will loss of 324m ² development land and will affect 25 landowners.	Minor Adverse										
	Noise and Vibration	In terms of vibration the Red route provides the greatest reduction in properties potentially affected by vibration, and only one previously unaffected. The Red route results in an increase in area adversely affected by noise Additionally there is a significant area that will experience noise reductions of at least 1dB or more.	Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option L _{A10} versus Do-Minimum L _{A10}) <table border="1"><thead><tr><th></th><th>Number of Residential Properties</th></tr></thead><tbody><tr><td>Significance of Impact</td><td>Red Route Option</td></tr><tr><td>Slight/ Moderate Adverse or worse</td><td>63</td></tr><tr><td>Slight/ Moderate Beneficial or Better</td><td>209</td></tr><tr><td>Ratio of 1dB or More Changes</td><td>3.3</td></tr></tbody></table>		Number of Residential Properties	Significance of Impact	Red Route Option	Slight/ Moderate Adverse or worse	63	Slight/ Moderate Beneficial or Better	209	Ratio of 1dB or More Changes	3.3	Slight beneficial
	Number of Residential Properties													
Significance of Impact	Red Route Option													
Slight/ Moderate Adverse or worse	63													
Slight/ Moderate Beneficial or Better	209													
Ratio of 1dB or More Changes	3.3													
	Pedestrians, Cyclists, Equestrians and Community Effects	No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the Red Route is predominantly offline and therefore does not interact with existing NMU routes. The Red Route results in slight positive influence on severance as it is predominantly offline through Foreglen. The reduced traffic in this area results in a positive impact on severance for the Foreglen community. The Red Route would traverse the existing NCN Route 93 (further south than where the existing road crosses the cycle route). The Red Route will sever this national cycle network and it will therefore have a negative impact on the cycle routes in the area.	N/A	Slightly Beneficial										
	Vehicle Travellers	Views along this section will generally range from intermittent to open, but would be predominantly open. View from the road will become more open overall as a result of traffic being diverted offline to the south of Foreglen, while the view from the road for the Junction at Ballyhanedin Road and Killunaught Road will remain intermittent / open with views of open space, hills and agricultural land.	N/A	Large Beneficial										

The Red Route should result in low levels of frustration for vehicle travellers. Travelling east from Claudy, there may be a reduction in frustration with the new road layout as a result of the junction at Ballyhanedin Road. Frustration associated with high traffic volumes, congestion and vehicles accessing and egressing from the existing Ballyhanedin junction will be reduced, as much of the traffic will be taken offline. Frustration will also be reduced as a result of the proposed roundabouts.

Option – Red Section 1		Description- The Red Route commences to the east of the settlement of Claudy. It lies directly south of the current alignment from the start of Section 1 until it passes east of Ballyhanedin Road junction. At this point the Red Route diverts offline to the south of the existing A6, passing to the south of the town of Foreglen. This route remains offline to the end of Section 1 and would tie in with two of new junctions, namely the grade separated junction at Ballyhanedin Road and the proposed junction at Killunaught Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £83.163m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		The issue of vehicles accessing and egressing from Ballyhanedin Road will be removed by the proposed Ballyhanedin junction and this will reduce fear of accidents. The proposed new junction will be safer as it is comprised of roundabouts and slip roads as opposed to T-junctions. The fear of accidents for this proposed route would be Low. The Red Route would reduce route uncertainty as a result of through traffic being taken offline to pass south of Foreglen, but the existing road remaining unaltered through Foreglen for local traffic.																											
	Road Drainage and the Water Environment	Some watercourses within the study area are considered to be of high importance and as a result careful consideration will need to be made to prevent, reduce and minimise potential adverse impacts. During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. The same impacts are predicted to be insignificant for minor watercourses. During the operation phase however, there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities. There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant. With regards flood risk, construction impacts range between low adverse significance and insignificant. Low adverse impacts may occur to the unnamed tributaries of Foreglen River and Wood Burn due to the potential for blockages to occur, and to Foreglen River as a result of an increase in flood risk. During operation there is the potential for highly significant adverse impacts to the River Foreglen due to afflux, and significant adverse impacts to Wood Burn also from afflux. The remaining impacts are considered to be low adverse to insignificant.	N/A	Moderate Adverse																									
	Geology and Soils	The Red Route crosses an extensive area of peat to the south of Foreglen. Peaty soils possess low cohesion properties, but their location on flatter ground indicates that there is a low likelihood of lateral movement of these soils as a result of construction activities. The Red Route also crosses peaty soils on moderate slopes to the south east of Foreglen. The excavation of a cutting to accommodate the new road would require stabilisation measures during construction to prevent downslope movement of soils with low cohesion properties, and would require reinforcement to retain those soils during operation. The Red Route avoids known contaminated land sites. DARD maps show that there are no fields infested with PWD or PCN along the route corridor.	There are 0 contaminated land sites and 0 fields infested with PWD or PCN.	Slight Adverse																									
	Impact of Road Schemes on Policies and Plans	The Red Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012. The route will improve freight transport links between Belfast and Londonderry. The Red Route will improve regional transport links from Londonderry to Dungiven, and will improve reliability of journey times. More specifically, it will divert traffic offline away from Foreglen Community. However, the offline Red Route will result in a larger land take and a loss of areas of open space.	Effect of the Proposed Red Route on Policies and Plans. <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>6</td> <td>4</td> <td>4</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>36</td> <td>40</td> <td>12</td> <td>1</td> </tr> <tr> <td>Local</td> <td>3</td> <td>25</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total</td> <td>45</td> <td>69</td> <td>16</td> <td>1</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	6	4	4	0	Regional	36	40	12	1	Local	3	25	0	0	Total	45	69	16	1	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	6	4	4	0																									
Regional	36	40	12	1																									
Local	3	25	0	0																									
Total	45	69	16	1																									
SAFETY	Accidents	The majority of this option is offline dual carriageway and as such will provide safety benefits because of the improved standard of the road and the separation of strategic and local traffic.	Total Number of Link and Junction Accidents: 226.3 Number of Link and Junction Fatalities: 17.7 Number of Link and Junction Serious: 84.7 Number of Link and Junction Slight: 299.5	Accidents PVB: £23.200m																									
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user-costs that would result from the construction of the Do Something scheme. The TEE table shows positive net benefits for consumer and business	Total Vehicle Hours: Do Min Total Link Vehicle Hours; 42.801	TEE Table Consumer PVB:																									

Option – Red Section 1		Description- The Red Route commences to the east of the settlement of Claudy. It lies directly south of the current alignment from the start of Section 1 until it passes east of Ballyhanedin Road junction. At this point the Red Route diverts offline to the south of the existing A6, passing to the south of the town of Foreglen. This route remains offline to the end of Section 1 and would tie in with two of new junctions, namely the grade separated junction at Ballyhanedin Road and the proposed junction at Killunaught Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.		Present Value of Costs £83.163m		
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		ASSESSMENT		
		users with an overall benefit of £8.646m. Accident benefits are £23.200m. Private sector users show a dis-benefit of £0.243m, emissions benefits also has a dis-benefit of £1.092. Overall the value of benefits is £30.511m. Costs are valued at £63.850m	Do Something Total Link Vehicle Hours; 38,452 Total Link Vehicle Hours Saved; 4,349		£2.975m Business PVB: £5.671m Private PVB: -£0.243m Emissions PVB: -£1.092m Operating+ PVC: -£7.172 Investment PVC: £71.023		
	Reliability	The red route is largely offline with some online dualling after the new grade separated junction at Ballyhanedin road which continues until the end of the scheme. As the majority of the scheme is offline, this will yield improved journey times for drivers, passengers and freight.	N/A		Slight Beneficial		
ACCESSIBILITY	Community Severance	Between Claudy and Foreglen, there are only a few dwellings alongside the road, on both the north and south side of the road. There are no notable community facilities on either side of the existing road and there is currently no severance of communities within this area. Where the new grade separated junction is proposed to the west of Dernaflaw, NMU facilities would be incorporated. This junction will provide good links to local roads accessing Foreglen. The alignment then runs parallel to the existing A6 and crosses two side roads on over-bridges as it approaches Dernaflaw. Considering the expected improvement in severance in Foreglen, overall severance for the Red Route would be considered 'slightly positive'.	Approx; 4 community facilities may be affected		Slight Beneficial		
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed route.	N/A		Slight Beneficial		
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A		Neutral		
	Land Use Planning	There is no notable loss of land. Identification of several areas of constraint on mineral developments within the proposed scheme.	N/A		Slight Adverse		
	Other Government Policies (Social inclusion and Local Economic Development)	In terms of social inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times.	N/A		Moderate Beneficial		
Overall Economic Assessment including Accident Benefits			Central Growth	PVC £63.850 M	PVB £30.511 M	NPV -£33.340 M	BCR 0.478

Option – Yellow Section 1		Description- The initial section of the Yellow Route is identical to the Red Route up until the Ballyhanedin Junction. From this point the Yellow Route continues online until it has passed Foreglen and the proposed junction with Altagarran and Altmoer Road. After this junction the Yellow Route diverts offline to the south, joining the Red Route just prior to passing through the proposed Killunaught Road junction. The Yellow Route is the only proposed route that would tie into all three proposed junctions.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £77.978m																																																							
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options.</p> <p>Overall the yellow option results in an improvement in air quality with regard to PM₁₀ concentrations in 2016.</p> <p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead. The least adverse impact with regard to emissions from road traffic was predicted for the Yellow Route.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead. The least adverse impact with regard to carbon emissions from road traffic was predicted for the Yellow Route.</p>	<p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Yellow</td> <td>-950.7</td> <td>-175.6</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td colspan="6">Do Minimum</td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Yellow</td> <td>72</td> <td>-4%</td> <td>11</td> <td>-4%</td> <td>64</td> <td>1%</td> <td>1.6</td> <td>2%</td> <td>7119</td> <td>1%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Yellow	-950.7	-175.6		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Yellow	72	-4%	11	-4%	64	1%	1.6	2%	7119	1%	<p>Local Air Quality - Major Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Yellow	-950.7	-175.6																																																								
	CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																						
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Yellow	72	-4%	11	-4%	64	1%	1.6	2%	7119	1%																																																	
Cultural Heritage	<p>The Yellow Route impacts upon 7 archaeological sites of which would be damaged or removed and therefore there would be an adverse impact upon the period of these sites.</p> <p>The Yellow Route is largely adjacent to the existing road and therefore there is a lower possibility of discovery of previously unrecorded archaeological sites than some of the other options.</p> <p>It is considered that the overall significance of effect of this route on the archaeological and cultural heritage resource is moderate adverse.</p>	<p>The Yellow Route impacts upon 7 archaeological sites; 4 of these comprise direct physical impacts and 3 are visual impacts. The visual impacts include impacts upon the setting of a Grade B church.</p>	Moderate Adverse																																																								
Disruption due to Construction	<p>Of all the options in Section 1, the Yellow Route appears to affect the most properties including a church, a school and a community centre in Foreglen. The option will involve exposure of all of these premises to the noise and dust associated with construction processes, and there is a potential for disruption of activities within the sensitive properties noted.</p> <p>This option is likely to have a severe impact on the existing road network as it is the option that influences the highest number of properties and access to these properties. The Yellow Route is also likely to have a negative effect on pedestrians attempting to cross the existing A6, for example from homes to community facilities and cyclists using the NCN Route 93 which traverses the existing road network.</p> <p>Bus journey routes and bus stops may be affected along the existing A6 during the proposed works.</p> <p>The potential impact on protected sites and ecology is greater for the Yellow Route as it will sever the Ovil SLNCI.</p> <p>The Yellow Route may impact on local wildlife through disturbance, mostly caused by noise, vibration and visual disturbance.</p>	<p>The Yellow Route affects the most properties, passing within 100 m of a total of 139 properties, including a church, a school and a community centre in Foreglen.</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the Foreglen River and Wood Burn. Both rivers are classified as salmonid under the Freshwater Fish Directive. The adverse effect on salmon populations in the Wood Burn is rated as lower because the crossing is near the headwaters of the river.</p> <p>Additional impacts of the proposed route will be on improved, semi-improved and arable farmland, none of which is of high botanical interest. Short lengths of the route will impact upon sites that are of greater biodiversity interest.</p> <p>The scheme would impact upon a small area of species-rich marshy grassland. Hedgerows that will be affected by the works are of low botanical interest, but record historical continuity of</p>	N/A	Slight Adverse																																																								

Option – Yellow Section 1		Description- The initial section of the Yellow Route is identical to the Red Route up until the Ballyhanedin Junction. From this point the Yellow Route continues online until it has passed Foreglen and the proposed junction with Altagarran and Altmover Road. After this junction the Yellow Route diverts offline to the south, joining the Red Route just prior to passing through the proposed Killunaught Road junction. The Yellow Route is the only proposed route that would tie into all three proposed junctions.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £77.978m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		the local field pattern. Mammal surveys have yet to be carried out along the route, but it is likely that otters, badgers and bats all occur within the route corridor.												
	Landscape Effects	From the commencement of the scheme to the Ballyhanedin Junction to a new dual carriage way will be built adjacent to the existing road. Retention of existing screening vegetation where possible and new mitigation planting would integrate the new road into the landscape limiting the impact. After the Ballyhanedin Junction on road widening as far as Munreery Bridge will also be of limited impact other than widening the roads physical footprint. On line widening would affect the road side through Foreglen and existing roadside vegetation, including semi mature trees, would be lost. Replacement and new planting could offset this in the longer term.	N/A	Minor Adverse										
	Land Use	The Yellow Route will result in required demolitions and will result in a small community land take arising from encroachment on existing community facilities in Foreglen The Yellow Route does not impact on land which is considered BMV land. Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.	The Yellow Route will result in 11required demolitions, with 3 residential, 5 commercial, 1industrial and 2 other demolition. The Yellow Route will result in a small community land take (143m ²) and will result in the loss of 3862 m ² of development land. The Yellow Route does not impact on land which is considered BMV land; however it will affect 40 landowners.	Slight Adverse										
	Noise and Vibration	In terms of vibration the Yellow Route will result in a reduction of several properties potentially affected by vibration. Few properties will experience an increase in vibration. The Yellow route results in an area adversely affected by noise. Additionally there is a significant area that will experience noise reductions of at least 1dB or more. At this stage it is not apparent as to whether the changes occur within what may be classed as high or low value community receptors.	Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option L _{A10} versus Do-Minimum L _{A10}) <table border="1"><thead><tr><th></th><th>Number of Residential Properties</th></tr></thead><tbody><tr><td>Significance of Impact</td><td>Yellow Route Option</td></tr><tr><td>Slight/ Moderate Adverse or worse</td><td>81</td></tr><tr><td>Slight/ Moderate Beneficial or Better</td><td>164</td></tr><tr><td>Ratio of 1dB or More Changes</td><td>2.0</td></tr></tbody></table>		Number of Residential Properties	Significance of Impact	Yellow Route Option	Slight/ Moderate Adverse or worse	81	Slight/ Moderate Beneficial or Better	164	Ratio of 1dB or More Changes	2.0	Slight Beneficial
	Number of Residential Properties													
Significance of Impact	Yellow Route Option													
Slight/ Moderate Adverse or worse	81													
Slight/ Moderate Beneficial or Better	164													
Ratio of 1dB or More Changes	2.0													
	Pedestrians, Cyclists, Equestrians and Community Effects	No significant change in the journey length being undertaken by pedestrians or cyclists is expected for the Yellow Route as the surveys undertaken indicated that most NMU journeys will be in the vicinity of a proposed junction and therefore a minimal journey length change is expected. This option is likely to improve the safety or amenity value for NMUs, if NMU facilities are included on the proposed Ballyhanedin Road junction. However, along the remainder of the route in this area, NMU movements will be confined to the existing A6, as pedestrian access will be severely limited to the proposed A6 dualling schemes. This option is mostly online and so amenity may not change significantly, except that better road furniture would be expected to improve safety for people along the road edge.	N/A.	Moderate Adverse										
	Vehicle Travellers	There will be a minimal change in terms of views from the road as this route is primarily online. When this option dips offline east of Foreglen, views will become more rural and the view from the road will be restricted due to Dernaflaw. The views from the road near the junctions at Ballyhanedin Road and at Altmover Road will remain intermittent / open with limited views of open space, hills and agricultural land. However, the bridges at these junctions could restrict views for short distances.	N/A	Large Beneficial										

Frustration associated with high traffic volumes, congestion and vehicles accessing and egressing the existing Ballyhanedin junction will be reduced, due to the new junction layout efficiently transferring traffic. Some minor frustration may result when the Yellow Route diverts offline south of Dernaflaw and vehicle travellers will have to navigate an unfamiliar road system.

Option – Yellow Section 1		Description- The initial section of the Yellow Route is identical to the Red Route up until the Ballyhanedin Junction. From this point the Yellow Route continues online until it has passed Foreglen and the proposed junction with Altagarran and Altmover Road. After this junction the Yellow Route diverts offline to the south, joining the Red Route just prior to passing through the proposed Killunaught Road junction. The Yellow Route is the only proposed route that would tie into all three proposed junctions.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value of Costs £77.978m
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT
		<p>The Yellow Route will reduce the fear of potential accidents as traffic travelling in each direction will be physically separated by a central reserve thus drivers will not need to enter a lane of opposing traffic in order to overtake. The fear of accidents as a result of vehicles accessing and egressing Ballyhanedin Road will be improved by the proposed Ballyhanedin junction. The proposed junction will be safer as it is comprised of roundabouts and slip roads as opposed to T-junctions.</p> <p>As the route is primarily the same and will be a large dual carriageway, uncertainty of route for through traffic will not be an important issue. The new junctions with regional routes may cause a degree of route uncertainty, but this should be short term and adequate signage should reduce this. The overall route uncertainty for the Yellow Route will be low to moderate.</p>		
	Road Drainage and the Water Environment	<p>Some watercourses within the study area are considered to be of high importance and as a result careful consideration will need to be made to prevent, reduce and minimise potential adverse impacts. During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. The same impacts are predicted to be insignificant for minor watercourses. During the operation phase however, there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities. Surface water impacts will need to be considered in the development of proposals for bridging watercourses and in the development of treatment proposals at the detailed design stage.</p> <p>There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant.</p> <p>With regards flood risk, construction impacts range between low adverse significance and insignificant. Low adverse impacts may occur to the unnamed tributaries of Foreglen River and Wood Burn due to the potential for blockages to occur, and to Foreglen River as a result of an increase in flood risk. During operation there is the potential for highly significant adverse impacts to the River Foreglen due to afflux, and significant adverse impacts to Wood Burn also from afflux. The remaining impacts are considered to be low adverse to insignificant.</p> <p>The extensive scale of the local bedrock geology means that it is unlikely to suffer significant adverse effects during construction works and operation.</p> <p>Drift and alluvial deposits will be disrupted by the construction works, but the spatially extensive nature of these deposits indicates that the significance of this impact will be low.</p> <p>The construction works will have minor effects on the geomorphology of the area.</p> <p>Disturbance of agricultural land may lead to the disturbance and redistribution of fertiliser and pesticide residues.</p>	N/A	Moderate Adverse
	Geology and Soils	<p>Contamination of adjacent land and watercourses may arise from working practices and from road runoff.</p> <p>There will be loss of agricultural soils in the lower DARD categories resulting from the construction of the new carriageway.</p> <p>The route lies within 100 m of contaminated land site a former petrol station / fuel storage area, with a potential for release of hydrocarbons from contaminated soils as a result of disturbance during construction.</p> <p>The route lies within 100 m of contaminated land site, described as reclaimed land. However, the site is now mainly occupied by a dwelling and associated gardens, and is unlikely to present a significant risk to construction.</p>	N/A	Slight Adverse

Option – Yellow Section 1		Description- The initial section of the Yellow Route is identical to the Red Route up until the Ballyhanedin Junction. From this point the Yellow Route continues online until it has passed Foreglen and the proposed junction with Altagarran and Altmover Road. After this junction the Yellow Route diverts offline to the south, joining the Red Route just prior to passing through the proposed Killunaught Road junction. The Yellow Route is the only proposed route that would tie into all three proposed junctions.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.				Present Value of Costs £77.978m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT				ASSESSMENT																									
	Impact of Road Schemes on Policies and Plans	<p>The Yellow Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012. The route will improve passenger journeys and freight transport links between Belfast and Londonderry.</p> <p>The Yellow Route will improve reliability of journey times which will help to support businesses and encourage growth and development.</p> <p>The Yellow Route will allow better and safer access and egress from minor roads such as Ballyhanedin Road and Altmover Road onto the A6. However, it is a predominately online option and as a result is not likely to improve crossing facilities at Foreglen.</p>	<p>Effect of the Proposed Yellow Route on Policies and Plans.</p> <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>6</td> <td>4</td> <td>4</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>36</td> <td>41</td> <td>11</td> <td>1</td> </tr> <tr> <td>Local</td> <td>3</td> <td>25</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total</td> <td>45</td> <td>70</td> <td>15</td> <td>1</td> </tr> </tbody> </table>				Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	6	4	4	0	Regional	36	41	11	1	Local	3	25	0	0	Total	45	70	15	1	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																												
National	6	4	4	0																												
Regional	36	41	11	1																												
Local	3	25	0	0																												
Total	45	70	15	1																												
SAFETY	Accidents	The majority of this option is online dual carriageway and as such will provide safety benefits, because of its improved standard of the road and the separation of strategic and local traffic.	Total Number of Link and Junction Accidents: 283.0 Number of Link and Junction Fatalities: 20.0 Number of Link and Junction Serious: 99.8 Number of Link and Junction Slight: 388.9				Accidents PVB: £27.084m																									
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user costs that would result from the construction of the Do Something scheme. The TEE Table shows negative net dis-benefits for consumer, business and private sector users and emissions. The overall dis-benefit is -£7.102m. Accident benefits are positive at £27.084m. The overall benefits are £19.983m.	Total Vehicle Hours Saved: Do Min Total Link Vehicle Hours: 42.801 Do Something Total Link Vehicle Hours: 40.619 Total Link Vehicle Hours Saved: 2.182				TEE Table Consumer PVB: -£3.417m Business PVB: -£2.103m Private PVB: -£0.376m Emissions PVB: -£1.206m Operating+ PVC: -£8.590m Investment PVC: £65.435m																									
	Reliability	The yellow route is for the majority online dualling which incorporates the new grade separated junctions at Ballyhanedin Road and Altmover Road which will improve journey time reliability for drivers, passengers and freight.	N/A				Slight Beneficial																									
ACCESSIBILITY	Community Severance	<p>Between Claudy and Foreglen, there are only a few dwellings alongside the road, on both the north and south side of the road. There are no notable community facilities on either side of the existing road and there is currently no severance of communities within this area.</p> <p>Dualling the A6 within Foreglen would have a very negative effect on community severance, further severing connections between the residents living to the north of Foreglen from the community facilities south of the existing A6. Similarly, the effects of the Yellow Route would increase severance to 'severe'.</p>	Approx; 4 community facilities may be affected				Large Adverse																									
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed route.	N/A				Slight Beneficial																									
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport as no interchanges have been created.	N/A				Neutral																									
	Land Use Planning	There is no notable loss of land. Identification of several areas of constraint on mineral developments within the proposed scheme.	N/A				Slight Adverse																									
	Other Government Policies (Social Inclusion and Local Economic Development)	In terms of social inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times.	N/A				Moderate Beneficial																									
Overall Economic Assessment including Accident Benefits			Central Growth	PVC £58.846 M	PVB £19.983 M	NPV -£36.863 M	BCR 0.352																									

Option –Blue Section 2		Description - Begins online at the western end of Section 2 and proceeds online to the proposed new junction with Derrychrier Road, it then diverts offline to the north passing both Dernaflaw and Dungiven to the proximate north.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £107.995m																																																							
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options.</p> <p>The Blue Route is less beneficial as it follows the existing A6 past Foreglen, less than 50 m from residential properties in Section 1. Only the Blue Route is forecast to have any impact on the residential roads north of Main Street in Dungiven, such as Ballyquin Road and Legavallon Road, removing traffic from these streets. However, the bypass lies north of Dungiven, passing fairly close to a larger number of residential properties than many of the other options in Section 2.</p> <p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead. Greatest impacts predicted were for the Blue Route.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p>	<p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Blue</td> <td>-958.8</td> <td>-175.3</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td colspan="6">Do Minimum</td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Blue</td> <td>75</td> <td>1%</td> <td>12</td> <td>1%</td> <td>68</td> <td>7%</td> <td>1.7</td> <td>8%</td> <td>7555</td> <td>7%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Blue	-958.8	-175.3		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Blue	75	1%	12	1%	68	7%	1.7	8%	7555	7%	<p>Local Air Quality - Major Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Blue	-958.8	-175.3																																																								
		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																					
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Blue	75	1%	12	1%	68	7%	1.7	8%	7555	7%																																																	
Cultural Heritage	<p>The Blue Route option would introduce a new feature into the area and have an adverse impact upon the rural context of the sites.</p> <p>The Blue Route in will an impact on the Registered Garden to Pellipar House.</p>	<p>The Blue Route upon 11 archaeological sites. These are all direct physical impacts and include impacts through the Registered Garden to Pellipar House.</p>	Large Adverse																																																								
Disruption due to Construction	<p>During construction, disruption to these roads is likely to be significant, and may result in severe delays to travellers and those using the existing road network.</p> <p>The Blue Route traverses the Pellipar Demesne.</p> <p>The Blue Route requires four watercourse crossings; the River Roe, the Derryware Burn and two minor watercourses, with the potential to cause pollution during the construction phase.</p>	<p>The Blue Route passes within 100m of a total of 105 properties, including 2 sports grounds.</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the River Roe & Tributaries SAC.</p> <p>Additional impacts of the proposed route will be on improved, semi-improved and arable farmland, none of which is of high botanical interest. Short lengths of the route will impact upon sites that are of greater biodiversity interest</p> <p>The scheme would impact upon a small area of native semi-natural woodland which is contiguous with the SAC.</p> <p>Mammal surveys have yet to be completed along the route, but it is likely that otters, badgers and bats all occur within the route corridor.</p>	N/A	Very Large Adverse																																																								
Landscape Effects	<p>The route crosses through the Dernaflaw LLPA and would cross in cutting immediately to the front of Dernaflaw house. Some large listed properties would be lost in this area. Entering LCZ 6, it crosses the River Roe through an attractive well wooded fieldscape to the west.</p> <p>Further east the route causes extensive impacts to the Pellipar House Demesne by traversing the estate grounds, destroying estate buildings, specimen parkland trees and the integrity of avenues.</p> <p>The initial impact of this option on the north-eastern boundary of the town edge within LCZ6 could reduce with planting mitigation, reducing impacts to Moderate Adverse by year 15. Impacts would remain Major Adverse on Pellipar House Demesnee [LCZ5.] Within LCZ 3, the road approach and cutting through the ridge crossing Dernaflaw road at its summit would remain a Major Adverse impact at 15 years after construction with limited scope for mitigation.</p>	N/A	Major Adverse																																																								
Land Use	<p>Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.</p> <p>The Blue route will encroach the Dungiven Celtic Soccer Pitch and the Kevin Lynch Hurling Club</p>	<p>The Blue Route will result in 22 required demolitions, with 3residential demolitions, 16 commercial , 2 other demolition, 0industrial demolitions. The Blue route will encroach upon 8467m² of residential land and will have a total loss of 7405 m² of community land . The Blue Route will result in a loss of 8926 m² of development land and 133404m² of BMV land.</p>	Slight Adverse																																																								

Option –Blue Section 2		Description - Begins online at the western end of Section 2 and proceeds online to the proposed new junction with Derrychrir Road, it then diverts offline to the north passing both Dernaflaw and Dungiven to the proximate north.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £107.995m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		pitch.	29 landowners will be affected.											
	Noise and Vibration	<p>The Blue Route results in the greatest number of dis-benefits within both the Core study area.</p> <p>In terms of vibration the Blue Route provides the greatest reduction in properties potentially affected by vibration, but also has the greatest increase in properties potentially increased vibration annoyance.</p> <p>There is a large increase in the overall community area that will experience an increase of at least 1dB or more in noise level, with the Blue option experiencing the least.</p>	<p>Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option LA10 versus Do-Minimum LA10)</p> <table border="1"> <thead> <tr> <th></th> <th>Number of Residential Properties</th> </tr> </thead> <tbody> <tr> <td>Significance of Impact</td> <td>Blue Route Option</td> </tr> <tr> <td>Slight/ Moderate Adverse or worse</td> <td>865</td> </tr> <tr> <td>Slight/ Moderate Beneficial or Better</td> <td>366</td> </tr> <tr> <td>Ratio of 1dB or More Changes</td> <td>0.4</td> </tr> </tbody> </table>		Number of Residential Properties	Significance of Impact	Blue Route Option	Slight/ Moderate Adverse or worse	865	Slight/ Moderate Beneficial or Better	366	Ratio of 1dB or More Changes	0.4	Slight Adverse
	Number of Residential Properties													
Significance of Impact	Blue Route Option													
Slight/ Moderate Adverse or worse	865													
Slight/ Moderate Beneficial or Better	366													
Ratio of 1dB or More Changes	0.4													
	Pedestrians, Cyclists, Equestrians and Community Effects	<p>No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the Blue Route is offline compared to the existing A6 and alternative means of crossing under or over the new road are proposed for existing NMU routes.</p> <p>The Blue Route results in a moderate positive change in severance, as it is predominantly offline, but causes disruption to NMU routes to the north of Dungiven. The majority of benefits are observed through the centre of Dungiven and Dernaflaw as the route is offline in this area, resulting in a substantial reduction in severance for these communities.</p>	N/A	Slight Beneficial										
	Vehicle Travellers	<p>Views will become more rural as the Blue Route diverges offline to the north around Dungiven. However, this option has several sections with large cut slopes which will restrict views in places and the view from the road will change from restricted to intermittent.</p> <p>The Blue Route diverts through traffic away from Dungiven Main Street and Dernaflaw, which should result in a substantial reduction in frustration. Overall, the Blue Route will result in low to moderate levels of frustration for vehicle travellers.</p> <p>The issues of parked cars, vehicles accessing and egressing roads and vulnerable road users would be reduced as traffic is taken offline to the north of Dernaflaw and Dungiven. Conditions will be much improved for pedestrians and other non motorised road users on Main Street and Chapel Road and delays in traffic flows will also be reduced. This option includes three new junctions which will be safer as they are comprised of roundabouts and slip roads. All of these factors will reduce fear of potential accidents.</p> <p>The Blue Route has the greatest degree of diversion of all the proposed routes and would therefore result in the greatest degree of route uncertainty.</p>	N/A.	Large Beneficial										
	Road Drainage and the Water Environment	<p>During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. During the operation phase however, there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities. There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant.</p> <p>With regards flood risk, construction impacts range between insignificant and highly adverse significance. Highly significant adverse impacts are predicted to occur to the River Roe. The remaining impacts are all considered to be low adverse or insignificant. During operation there is the potential for very significant adverse impacts to the River Roe from the potential to increase flood risk, loss of floodplain storage and afflux, and significant adverse impacts to the River Roe from the potential for blockages of the channel.</p>	N/A	Moderate Adverse										
	Geology and Soils	Short stretches of the Blue Route pass through BMV agricultural land at the extreme eastern end of the route and immediately to the west of Dernaflaw.	The route passes within approximately 100 m of the Dernaflaw ESCR site, which should be protected during the construction phase. The Blue Route also passes directly through a field	Slight Adverse										

Option –Blue Section 2		Description - Begins online at the western end of Section 2 and proceeds online to the proposed new junction with Derrychrier Road, it then diverts offline to the north passing both Dernaflaw and Dungiven to the proximate north.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £107.995m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		<p>The route passes within around 100 m of the Dernaflaw ESCR site, but will have no impact on the features of geological interest.</p> <p>The route crosses licensed area of mineral extraction, which is currently in agricultural use.</p> <p>The route crosses contaminated land site which has been reclaimed for agriculture, and is unlikely to present a significant risk to construction.</p> <p>The route crosses contaminated land site, described as mineral workings, and now part of an industrial site. This site is unlikely to present a significant risk to construction.</p>	infested with PWD, and is adjacent to another infested field.																										
	Impact of Road Schemes on Policies and Plans	<p>The Blue Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012.</p> <p>The Blue Option will improve regional transport links between Londonderry and Dungiven, and will improve reliability of journey times. More specifically, it will remove traffic away from Dernaflaw making it easier to walk within the community. The Blue Option will also remove traffic from Main Street in Dungiven resulting in better air quality, for Dungiven Town Centre and making it easier to walk and cycle, all of which are objectives of the White Paper A New Deal for Transport: Better for Everyone (1998).</p> <p>The Blue Route of Section 2 will pass through Pellipar House and may affect Browns Bridge and Derryware Bridge which are designated as industrial heritage sites. In order to comply with Policy BH 11: Development affecting the setting of a Listed Building in PPS6 mitigation measures will be needed for any activities which may have an effect on the industrial heritage sites.</p>	<p>Effect of the Proposed Blue Route on Policies and Plans.</p> <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>7</td> <td>6</td> <td>1</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>34</td> <td>42</td> <td>11</td> <td>2</td> </tr> <tr> <td>Local</td> <td>2</td> <td>25</td> <td>0</td> <td>1</td> </tr> <tr> <td>Total</td> <td>43</td> <td>73</td> <td>12</td> <td>3</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	7	6	1	0	Regional	34	42	11	2	Local	2	25	0	1	Total	43	73	12	3	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	7	6	1	0																									
Regional	34	42	11	2																									
Local	2	25	0	1																									
Total	43	73	12	3																									
SAFETY	Accidents	The majority of this option is offline dual carriageway and as such will provide safety benefits, because of its improved standard of the road and the separation of strategic and local traffic.	<p>Total Number of Link and Junction Accidents: 32.3</p> <p>Number of Link and Junction Fatalities: 1.1</p> <p>Number of Link and Junction Serious: 2.9</p> <p>Number of Link and Junction Slight: -76.4</p>	Accidents PVB: £0.641m																									
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user-costs that would result from the construction of the Do-Something scheme. The TEE table shows positive net benefits to consumer, business and accident benefits with an overall benefit of £88.669m. Private sector users and emissions showed a combined dis-benefit of £0.640m. The present value of benefits is therefore a positive £88.029m.	<p>Total Vehicle Hours Saved:</p> <p>Do Min Total Vehicle Hours: 71,857</p> <p>Do Something Total Vehicle Hours: 54,644</p> <p>Total Vehicle hours Saved: 17,213</p>	<p>TEE Table</p> <p>Consumer PVB: £41.128m</p> <p>Business PVB: £46.900m</p> <p>Private PVB: -£0.017m</p> <p>Emissions PVB: -£0.623m</p> <p>Operating + ITR PVC: -£0.699m</p> <p>Investment PVC: £92.600m</p>																									
	Reliability	The bypass will increase the reliability of journey times. The blue route is an offline option with a bypass and online dualling only in small sections which yields more reliable journey times for drivers, passengers and freight.	N/A	Large Beneficial																									
ACCESSIBILITY	Community Severance	<p>A bypass would remove the existing severance which may be felt in Dungiven through the removal of a large proportion of traffic. The bypass will also improve traffic noise and road safety fears and improve neighbourhood lifestyle and interaction possibilities.</p> <p>A new dual carriageway road to the north of Dungiven may, however, cause community severance between the residents of Dungiven and the countryside to the north and east of Dungiven. This option passes through the Dungiven Celtic FC pitches to the north of Dungiven, resulting in the loss of a large community facility. It also forms a physical barrier to future development beyond the proposed route to the north of Dungiven. The route also disrupts access to established marked ways such as the Ulster Way. This may lead to increased journey times</p>	Approx; 10 community facilities may be affected	Moderate Adverse																									

Option –Blue Section 2		Description - Begins online at the western end of Section 2 and proceeds online to the proposed new junction with Derrychrier Road, it then diverts offline to the north passing both Dernaflaw and Dungiven to the proximate north.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.				Present Value Cost £107.995m
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT				ASSESSMENT
		when accessing the countryside on foot or by bicycle. In addition, the new road is likely to carry above 16,000 vehicles per day (AADT). Overall, this option is likely to result in a moderate adverse level of severance.					
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed scheme.	N/A				Slight Beneficial
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A				Neutral
	Land Use Planning	No notable loss of land. Identification of several areas of constraint on mineral developments within the proposed scheme. The scheme passes through Pellipar House and may affect Browns Bridge and Derryware Bridge which are designated as industrial heritage sites. This route may also traverse playing fields at Drumane Road	N/A				Moderate Adverse
	Other Government Policies (Social Inclusion and Local Economic Development)	In terms of social inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times.	N/A				Slight Beneficial
Overall Economic Assessment including Accident Benefits			Central Growth	PVC	PVB	NPV	BCR
				£88.818 M	£88.029 M	-£0.07 M	0.991

Option – Brown Section 2		Description - duals the existing A6 alignment from the start of Section 2 up to the new junction with Feeny Road, it then diverts to the south.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £107.370m																																															
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																															
ENVIRONMENT	Air Quality	<p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p>	<p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td colspan="6">Do Minimum</td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Brown</td> <td>74</td> <td>-1%</td> <td>12</td> <td>-1%</td> <td>65</td> <td>3%</td> <td>1.6</td> <td>3%</td> <td>7284</td> <td>3%</td> </tr> </tbody> </table>		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Brown	74	-1%	12	-1%	65	3%	1.6	3%	7284	3%	
		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																													
	Do Minimum																																																		
	2008	69	11	88	2.4	6049																																													
	2016	74	12	63	1.6	7060																																													
2031	85	14	68	1.8	7998																																														
2016 Do Something (% relative to 2016 Do Minimum)																																																			
Brown	74	-1%	12	-1%	65	3%	1.6	3%	7284	3%																																									
Cultural Heritage	The Brown Route option will impact upon the condition of several of the recorded archaeological sites. The Brown Route will have an impact on the setting of the Dungiven Priory and Standing Stone Scheduled Monuments.	There are 13 archaeological sites that will be either directly or visually affected by the Brown Route; 3 of impacts upon the setting of cultural heritage features, including two Scheduled Monuments. The remainder of the impacts are direct physical effects.	Moderate Adverse																																																
Disruption due to Construction	<p>The online section of the Brown option is likely to have the largest negative effect on the existing road network in the Dernaflaw region. It will inevitably impact on bus journeys and bus stops and the movement of people towards community facilities on the southern side of the existing A6.</p> <p>Where this route merges with the existing A6 at the eastern edge of Dungiven, there is likely to be a negative impact on users of the existing route during the construction phase.</p> <p>The Brown Route will also have an impact on the setting of the Dungiven Priory and Standing Stone Scheduled Monuments.</p> <p>The Brown Route crosses over the Owenbeg River and the River Roe and there is the potential to cause pollution during the construction phase.</p>	The Brown Route passes within 100 m of a total of 143 properties, including a church, school and a GAA facility.	Slight Adverse																																																
Ecology and Nature Conservation	<p>The proposed route crosses the River Roe & Tributaries SAC.</p> <p>Additional impacts of the proposed route will be on improved, semi-improved and arable farmland, none of which is of high botanical interest. Short lengths of the route will impact upon sites that are of greater biodiversity interest</p> <p>The scheme would impact upon a small area of native semi-natural woodland which is contiguous with the SAC.</p> <p>Mammal surveys have yet to be completed along the route, but it is likely that otters, badgers and bats all occur within the route corridor.</p>	N/A	Very Large Adverse																																																
Landscape Effects	<p>The Brown Route results in a loss of road side vegetation and relatively minor cuttings and embankments as far as Feeny Road. Beyond Feeny Road, where it takes a new line and crosses into LCZ4.</p> <p>At Year 1, the impact would be Minor Adverse as far as the Feeny Road earthworks and junction and the same as the Red Route beyond this; this would give an overall intermediate rating of Major to Moderate adverse for LCZ3 and Major Adverse for LCZ4.</p> <p>At year 15, with the benefit of planting and landscape earthwork mitigation to help the overall widened road integration, and planting particularly to mitigate the impact of the embankment south of Dungiven, the impact could be reduced to Moderate Adverse.</p>	N/A	Moderate Adverse																																																
Land Use	Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.	<p>The Brown Route will result in 18 demolitions (including a grade separated junction) or 15 demolitions (including a roundabout). It will also result in a residential land take of 12701m² (including a grade separated junction)/ or 9715 m² (including a roundabout).</p> <p>The Brown Option results in a total community land take of 13787 m² to include a grade separated junction or 12882 m² including a roundabout.</p> <p>The Brown Route will result in the removal of 79809 m² (including a grade separated junction)</p>	Slight Adverse																																																

The Brown Option results in the second largest community land take by encroaching upon St John's Primary School and its associated playground.

The Brown Route will result in the removal of 79809 m² (including a grade separated junction)

Option – Brown Section 2		Description - duals the existing A6 alignment from the start of Section 2 up to the new junction with Feeny Road, it then diverts to the south.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £107.370m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
			of development land or 8035 m ² (including a roundabout). The Brown Route will result in 204800 m ² of BMV land loss if a grade separated junction is included and will affect 17 landowners or 209445 m ² if a roundabout is included and will affect 18 landowners.											
	Noise and Vibration	<p>The Brown Option results in the least number of properties predicted to experience a decrease in noise, but the most that will experience no change.</p> <p>There is a large increase in the overall community area that will experience an increase of at least 1dB or more in noise.</p>	<p>Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option L_{A10} versus Do-Minimum L_{A10})</p> <table border="1"> <thead> <tr> <th></th> <th>Number of Residential Properties</th> </tr> </thead> <tbody> <tr> <td>Significance of Impact</td> <td>Brown Route Option</td> </tr> <tr> <td>Slight/ Moderate Adverse or worse</td> <td>338</td> </tr> <tr> <td>Slight/ Moderate Beneficial or Better</td> <td>696</td> </tr> <tr> <td>Ratio of 1dB or More Changes</td> <td>2.1</td> </tr> </tbody> </table>		Number of Residential Properties	Significance of Impact	Brown Route Option	Slight/ Moderate Adverse or worse	338	Slight/ Moderate Beneficial or Better	696	Ratio of 1dB or More Changes	2.1	Slight Beneficial
	Number of Residential Properties													
Significance of Impact	Brown Route Option													
Slight/ Moderate Adverse or worse	338													
Slight/ Moderate Beneficial or Better	696													
Ratio of 1dB or More Changes	2.1													
	Pedestrians, Cyclists, Equestrians and Community Effects	<p>No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the Brown Route is offline through Dungiven compared to the existing A6 and in the vicinity of Dernaflaw, a maximum journey alteration of 3 minutes is expected. This alteration is likely where people are attempting to pass from the north to the southern portion of Dernaflaw and have to divert their existing route to an underpass to the east of Dernaflaw. Alterations to NMU journey lengths are expected, particularly in the vicinity of the current junction of Dernaflaw Road with the existing A6.</p> <p>The Brown Route in Section 2, results in a large negative change in severance, as it is online through Dernaflaw and up to the outskirts of Dungiven. The route also causes disruption to NMU routes to the south of Dungiven (e.g. the route to the Dungiven Priory). The benefits of this route are observed through the centre of Dungiven as the route is offline in this area, resulting in a substantial reduction in severance for this community. This discussion of severance has not, however, considered the disruption to existing community sports facilities in Foreglen.</p>	<p>No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the Brown Route is offline through Dungiven compared to the existing A6 and in the vicinity of Dernaflaw.</p> <p>This route is used by approximately 36 pedestrians and 3 cyclists on weekdays, although these NMUs have a maximum current journey length of 8 minutes, which will change to a maximum of 15 minutes. This results in no overall change in the number of NMUs conducting journeys in the two categories of less than 30 minutes and more than 30 minutes.</p>	Severe Adverse										
	Vehicle Travellers	<p>Where the route diverts offline views will become more rural and the view from the road will become intermittent / open with views of open space, hills and agricultural land.</p> <p>This option will also bypass Main Street taking vehicle travellers out of a built up area into more open space. This will open up views; as a result the view from the road will change from restricted to open. At its most eastern extent, the Brown Route remains online and as a result there will be minimal change in terms of View from the Road. The Brown Route will result in the view becoming intermittent / open along the route.</p> <p>The new junction joining Feeny Road and Foreglen Road, the new grade separated junction at Chapel Road and the proposed roundabout on Chapel Road may cause some slight frustration due to delays during construction. However, use of appropriate signage should reduce these frustrations.</p> <p>This option will result in the least change to the existing route. As a result, fear of potential accidents will still remain a factor contributing to driver stress. However, the diversion of traffic around Dungiven will reduce interactions with non-motorised users and therefore should reduce the fear of potential accidents for this portion of the route. The proposed new junction with Feeny Road will allow for better traffic flows and therefore should reduce the fear of potential accidents. The fear of accidents for this route option will remain moderate. Route uncertainty will be low to moderate.</p>	N/A	Large Beneficial										
	Road Drainage and the Water Environment	<p>During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. During the operation phase, however, there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities.</p>	N/A	Moderate Adverse										

Option – Brown Section 2		Description - duals the existing A6 alignment from the start of Section 2 up to the new junction with Feeny Road, it then diverts to the south.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £107.370m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		<p>There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant.</p> <p>With regards flood risk, construction impacts range between insignificant and highly adverse significance. Highly adverse significant impacts may occur when works are close to the River Roe (i.e. where it is bridged) as a result of the potential for flooding and loss of flood plain storage. Other less significant adverse impacts could occur as a result of blockages to watercourses. During operation there is the potential for very significant adverse impacts to the River Roe and significant adverse impacts to the Owenbeg River due to the potential for flooding, loss of floodplain storage and afflux.</p>																											
	Geology and Soils	<p>A short stretch of the Brown Route passes through BMV agricultural land at the extreme eastern end of the route, and more extensively to the southwest of Dungiven.</p> <p>The Brown Route impinges on contaminated land site, described as mineral workings. This site has been reclaimed and is unlikely to present a significant risk to construction.</p> <p>The route crosses contaminated land site which has been reclaimed for agriculture, and is unlikely to present a significant risk to construction.</p> <p>The route passes within 100 m of contaminated land site, described as mineral workings. This land has been reclaimed for agriculture and is unlikely to present a significant risk to construction.</p> <p>The route lies adjacent to licensed area of mineral extraction B/1973/0004, which is currently in agricultural use.</p>	This route passes directly through 1 field infested with PWD.	Slight Adverse																									
	Impact of Road Schemes on Policies and Plans	<p>The Brown Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012.</p> <p>The Brown Route will improve regional transport links between Londonderry and Dungiven, and will improve reliability of journey times. The Brown Route will also remove traffic from Main Street in Dungiven resulting in better air quality, for Dungiven Town Centre and making it easier to walk and cycle all of which are objectives of the White Paper A New Deal for Transport: Better for Everyone (1998)</p> <p>It will however, infringe upon the area of green belt which has been designated around Dungiven by Policy GB_CPA1 Designation of Greenbelts and Countryside Policy Areas, in 'A Planning strategy for Rural Northern Ireland' and superseded by 'PPS 21: Sustainable Development in the Countryside'. This route will also bisect the area between Dungiven Priory and a Standing Stone (Scheduled Monument) (Policy BH 1 The Preservation of Archaeological Remains of Regional Importance and their Settings).</p>	<p>Effect of the Proposed Brown Route on Policies and Plans.</p> <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>7</td> <td>6</td> <td>1</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>34</td> <td>42</td> <td>12</td> <td>1</td> </tr> <tr> <td>Local</td> <td>2</td> <td>25</td> <td>0</td> <td>1</td> </tr> <tr> <td>Total</td> <td>43</td> <td>73</td> <td>13</td> <td>2</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	7	6	1	0	Regional	34	42	12	1	Local	2	25	0	1	Total	43	73	13	2	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	7	6	1	0																									
Regional	34	42	12	1																									
Local	2	25	0	1																									
Total	43	73	13	2																									
SAFETY	Accidents	The majority of this option is offline dual carriageway and as such will provide safety benefits because of the improved standard of the road and the separation of strategic and local traffic.	<p>Total Number of Link and Junction Accidents: 145.0 Number of Link and Junction Fatalities: 0.7 Number of Link and Junction Serious: -7.5 Number of Link and Junction Slight: -220.1</p>	Accidents PVB: -£2.814m																									
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user-costs that would result from the construction of the Do-Something scheme. The TEE table shows positive net benefits to consumer, business and private users with an overall benefit of £98.196m. Dis-Benefits are shown by accidents and emissions totalling to £3.064m. Overall PVB is a positive £95.132m.	<p>Total Vehicle Hours Saved: Do Min Total Vehicle Hours: 71,857 Do Something Total Vehicle Hours: 51,525 Total Vehicle Hours Saved: 20,333</p>	<p>TEE Table Consumer PVB: £46.134m Business PVB: £51.786m Private PVB: £0.277m Emissions PVB: - £0.250m Operating + ITR PVC:</p>																									

Option – Brown Section 2		Description - duals the existing A6 alignment from the start of Section 2 up to the new junction with Feeny Road, it then diverts to the south.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.		Present Value Cost £107.370m		
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		ASSESSMENT		
					-£1.318 Investment PVC: £91.303		
	Reliability	The bypass will increase the reliability of journey times. The cyan route is an offline option with a bypass and online dualling only in small sections which yields more reliable journey times for drivers, passengers and freight.	N/A		Large Beneficial		
ACCESSIBILITY	Community Severance	A bypass would remove the existing severance which may be felt in Dungiven through the removal of a large proportion of traffic. The bypass will also improve traffic noise and road safety fears and improve neighbourhood lifestyle and interaction possibilities. As the new road is likely to carry over 16,000 vehicles per day (AADT) this option would result in a severe level of severance. It is likely that people would be deterred from making trips on foot across to the community facilities on the other side of the road, and may even re-organise their habits by choosing to drive their children to school, for example, as it may be safer. This may lead to a change in the location of centres of activity, or people may find it easier to drive into Dungiven, for example, to go to the shops or the post office.	Approx; 10 community facilities may be affected		Large Adverse		
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed scheme.	N/A		Slight Beneficial		
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A		Neutral		
	Land Use Planning	There is no notable loss of zoned land. Identification of several areas of constraint on mineral developments within section 2 of the proposed scheme. The Brown route will have a moderate adverse impact on Dungiven Priory scheduled Monument and the Standing stone Scheduled Monument within Dungiven. Community facilities may be affected as well as access to the Dungiven Priory	N/A		Moderate Adverse		
	Other Government Policies (Social Inclusion and Local Economic Development)	In terms of social inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times	N/A		Slight Beneficial		
Overall Economic Assessment including Accident Benefits			Central Growth	PVC £89.985 M	PVB £95.132 M	NPV £5.147 M	BCR 1.057

OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>Description-Cyan Route- lies predominantly to the south of the River Roe, crossing the river to the west of Dungiven Priory. The route joins the existing A6 through at Chapel Road.</p> <p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p>	<p>Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor.</p> <p>The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.</p> <p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Cyan</td> <td>-1115.3</td> <td>-210.8</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td colspan="6">Do Minimum</td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Cyan</td> <td>74</td> <td>0%</td> <td>12</td> <td>-1%</td> <td>66</td> <td>4%</td> <td>1.7</td> <td>5%</td> <td>7352</td> <td>4%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Cyan	-1115.3	-210.8		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Cyan	74	0%	12	-1%	66	4%	1.7	5%	7352	4%	<p>Present Value Cost £74.450m</p> <p>Local Air Quality - Major Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Cyan	-1115.3	-210.8																																																								
		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																					
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Cyan	74	0%	12	-1%	66	4%	1.7	5%	7352	4%																																																	
Cultural Heritage	<p>The Cyan Route option will impact upon the condition of several of the recorded archaeological sites. There will be impacts upon the setting of Dungiven Priory and a megalithic tomb, both Scheduled Monuments.</p> <p>A number of sites will be affected by this route option, both directly and indirectly.</p>	<p>The Cyan Route affects 18 archaeological sites; 10 of these are direct physical impacts, 2 possibly direct and 7 are impacts upon the setting of cultural heritage sites.</p>	Moderate Adverse																																																								
Disruption due to Construction	<p>The Cyan Route passes within 100 m of 82 properties, including a church. The majority of these occur as the route passes to the south of Dungiven. This route crosses several relatively minor local roads and a B-class road leading towards Feeny (B74).</p> <p>As it diverges south of Dernaflaw, this option is not likely to significantly disrupt users of the existing A6. Where this route merges with the existing A6 at the south eastern edge of Dungiven, this is likely to negatively impact on users of the existing road network during the construction phase.</p> <p>The Cyan Route will have an impact on the setting of the Dungiven Priory and Standing Stone Scheduled Monuments.</p> <p>The Cyan Route crosses over the Owenbeg River, the Foreglen River, the River Roe and various smaller tributaries. There is potential to cause pollution during the construction phase.</p>	<p>The Cyan Route passes within 100 m of 82 properties, including a church.</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the River Roe & Tributaries SAC.</p> <p>Additional impacts of the proposed route will be on improved, semi-improved and arable farmland, none of which is of high botanical interest. Short lengths of the route will impact upon sites that are of greater biodiversity interest</p> <p>The scheme would impact upon an area of developing bog woodland and scrub on a degraded raised bog.</p> <p>A number of hedgerows that will be affected by the works are species-rich and likely to be a considerable age and local historical and ecological significance.</p> <p>Mammal surveys have yet to be completed along the route, but it is likely that otters, badgers and bats all occur within the route corridor.</p>	N/A.	Very Large Adverse																																																								
Landscape Effects	<p>Between the Owenbeg and Roe floodplain the Cyan Route requires large scale earthworks to carry the road over the Roe to the east, before going into cutting in and/or embankment (depending on the junction option at the east of Dungiven) between the standing stone and priory immediately to the South of Dungiven. This area is of particular significance; the setting of Dungiven Priory and the large standing stone- both scheduled monuments- are of</p>	N/A	Moderate Adverse																																																								

Option – Cyan Section 2		Description-Cyan Route- lies predominantly to the south of the River Roe, crossing the river to the west of Dungiven Priory. The route joins the existing A6 through at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £74.450m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		particular concern to NIEA Built Heritage. The road is in cutting or embankment directly below the standing stone and leading to the proposed junction further east. The Cyan Route option would create initial Major Adverse Impacts in LCZ3 and 4.												
	Land Use	The Cyan Option will encroach upon the recreational area surrounding Dungiven Priory, but will not impact physically upon the Priory. Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.	The Cyan Route will result in 10 demolitions (including a grade separated junction) or 9 demolitions (including a roundabout). None of these are dwelling houses. It will also result in a residential land take of 6795m ² (including a grade separated junction) or 6146 m ² (including a roundabout). The Cyan Option will have a total community land loss of 12791 m ² including a grade separated junction or 10860 m ² including a roundabout). The Cyan Route will result in the removal of 7788 m ² (including a grade separated junction) of development land or 5350 m ² (including a roundabout). The Cyan Route will result in 157259m ² of BMV land loss if a grade separated junction is included and will affect 15 landowners or 152492 m ² if a roundabout is included and will affect 16 landowners	Minor Adverse										
	Noise and Vibration	In terms of vibration the Cyan Route will result in a reduction of several properties potentially affected by vibration, however some properties will experience an increase in vibration. There is a large increase in the overall community area that will experience an increase of at least 1dB or more in noise.	Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option LA10 versus Do-Minimum LA10) <table border="1"><thead><tr><th></th><th>Number of Residential Properties</th></tr></thead><tbody><tr><td>Significance of Impact</td><td>Cyan Route Option</td></tr><tr><td>Slight/ Moderate Adverse or worse</td><td>152</td></tr><tr><td>Slight/ Moderate Beneficial or Better</td><td>384</td></tr><tr><td>Ratio of 1dB or More Changes</td><td>2.5</td></tr></tbody></table>		Number of Residential Properties	Significance of Impact	Cyan Route Option	Slight/ Moderate Adverse or worse	152	Slight/ Moderate Beneficial or Better	384	Ratio of 1dB or More Changes	2.5	Slight Beneficial
	Number of Residential Properties													
Significance of Impact	Cyan Route Option													
Slight/ Moderate Adverse or worse	152													
Slight/ Moderate Beneficial or Better	384													
Ratio of 1dB or More Changes	2.5													
	Pedestrians, Cyclists, Equestrians and Community Effects	No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the Cyan Route is offline compared to the existing A6 and alternative means of crossing under or over the new road are proposed for existing NMU routes. Slight alterations to NMU journey lengths are expected, such as those to Dungiven Priory, however, the difference in journey length is likely to be within the order of 1 to 2 minutes. The Cyan Route will result in a moderate positive change in severance, as it is predominantly offline, but does disrupt NMU routes in close proximity to Dungiven (e.g. the route to the Dungiven Priory). The majority of benefits are observed through the centre of Dungiven and Dernaflaw as the route is offline in this area, resulting in a substantial reduction in severance for these communities.	Slight alterations to NMU journey lengths are expected, such as those to Dungiven Priory, however, the difference in journey length is likely to be within the order of 1 to 2 minutes.	Moderate Beneficial										
	Vehicle Travellers	Views will become more open as the Cyan Route diverges offline to the south of the A6. However, views will be restricted in places due to cut slopes. This option will also bypass both Dernaflaw and Dungiven, taking vehicle travellers out of built up areas into more open space. Both the grade separated junction and roundabout at Chapel Road could help improve the views from the road as they will allow travellers to bypass Dungiven Main Street and move into open space.	N/A.	Large Beneficial										

The Cyan Route diverts through traffic away from Dungiven Main Street and Dernaflaw, which should result in a substantial reduction in frustration by eliminating the existing delays and speed restrictions through these regions. The proposed new junction with Chapel Road may result in slight frustration for local travellers as it prevents the direct flow of traffic into Dungiven. Overall, the Cyan Route will result in low levels of frustration for vehicle travellers. The Cyan Route should reduce the fear of potential accidents as it diverts traffic south of

Option – Cyan Section 2		Description-Cyan Route- lies predominantly to the south of the River Roe, crossing the river to the west of Dungiven Priory. The route joins the existing A6 through at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £74.450m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		<p>Dernaflaw and Dungiven and around these congestion points. There will also be less opportunity for vehicular / pedestrian conflict as a result of the proposed junction options. The Cyan Route will result in a moderate to low fear of accidents as a result of its diversion around Dernaflaw and Dungiven.</p> <p>The Cyan Route diverts a substantial distance south of Dernaflaw and Dungiven. This relatively large diversion may result in an increase in route uncertainty. Some accesses to/from Dernaflaw, Owenbeg and Feeny Road will change, altering existing routes. The proposed new junction options at Chapel Road will also alter existing routes and therefore cause some uncertainty for travellers. However, with use of adequate signage, this should be reduced.</p>																											
	Road Drainage and the Water Environment	<p>During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance.</p> <p>During the operation phase, there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities. There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant.</p> <p>With regards flood risk, construction impacts range between insignificant and very adverse significance. Very significant adverse impacts are predicted to occur to the Owenrigh River from flood risk, and highly significant adverse impacts to the River Roe and Owenrigh River. During operation there is the potential for very significant adverse impacts to the River Roe and Owenrigh River. Highly significant adverse impacts could occur to the River Roe from the potential to increase flood risk.</p>	N/A	Moderate Adverse																									
	Geology and Soils	<p>A short stretch of the Cyan Route passes through BMV agricultural land at the extreme eastern end of the route.</p> <p>The route crosses the site of a former textile mill. Disturbance of this site has the potential to release any entrained contaminants into the environment.</p> <p>The route passes within 100 m of contaminated land site, described as mineral workings. This land has been reclaimed for agriculture and is unlikely to present a significant risk to construction.</p> <p>The route crosses the site of a former textile mill. Disturbance of this site may have the potential to release any entrained contaminants into the environment and should be investigated prior to construction</p>	DARD maps show that there are 0 fields infested with PWD or PCN along the route corridor.	Slight Adverse																									
	Impact of Road Schemes on Policies and Plans	<p>The Cyan Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012.</p> <p>The Cyan Route will improve regional transport links between Londonderry and Dungiven, and will improve reliability of journey times. More specifically, it will remove traffic away from Dernaflaw making it easier to walk within the community. The Cyan Route will also remove traffic from Main Street in Dungiven resulting in better air quality, for Dungiven Town Centre and making it easier to walk and cycle, all of which are objectives of the White Paper A New Deal for Transport: Better for Everyone (1998).</p> <p>It will however, infringe upon the area of green belt which has been designated around Dungiven by Policy GB_CPA1 Designation of Greenbelts and Countryside Policy Areas, in 'A Planning strategy for Rural Northern Ireland' and superseded by 'PPS 21: Sustainable Development in the Countryside' . This route will also bisect the area between Dungiven</p>	<p>Effect of the Proposed Cyan Route on Policies and Plans.</p> <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>7</td> <td>6</td> <td>1</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>37</td> <td>41</td> <td>10</td> <td>1</td> </tr> <tr> <td>Local</td> <td>1</td> <td>26</td> <td>0</td> <td>1</td> </tr> <tr> <td>Total</td> <td>45</td> <td>73</td> <td>11</td> <td>2</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	7	6	1	0	Regional	37	41	10	1	Local	1	26	0	1	Total	45	73	11	2	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	7	6	1	0																									
Regional	37	41	10	1																									
Local	1	26	0	1																									
Total	45	73	11	2																									

Option – Cyan Section 2		Description-Cyan Route- lies predominantly to the south of the River Roe, crossing the river to the west of Dungiven Priory. The route joins the existing A6 through at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.		Present Value Cost £74.450m			
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		ASSESSMENT			
		Priory and a Standing Stone (Scheduled Monument) (Policy BH 1 The Preservation of Archaeological Remains of Regional Importance and their Settings).						
SAFETY	Accidents	The majority of this option is offline dual carriageway and as such will provide safety benefits, because of its improved standard of the road and the separation of strategic and local traffic.	Total Number of Link and Junction Accidents: -88.7 Number of Link and Junction Fatalities: 2.9 Number of Link and Junction Serious: 8.7 Number of Link and Junction Slight: -114.3		Accidents PVB: £0.841m			
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user-costs that would result from the construction of the Do-Something scheme. The TEE table shows positive net benefits to consumer, business and private users, accidents and emission with an overall benefit of £110.463m.	Total Vehicle Hours Saved: Do Min Total Vehicle Hours: 71,857 Do Something Total Vehicle Hours: 51,512 Total Vehicle Hours Saved 20,345		TEE Table Consumer PVB: £51.847m Business PVB: £56.582m Private PVB: £0.611m Emissions PVB: £0.582m Operating + ITR PVC: £5.986m Investment PVC: £62.637m			
	Reliability	The bypass will increase the reliability of journey times. The cyan route is an offline option with a bypass and online dualling only in small sections which yields more reliable journey times for drivers, passengers and freight.	N/A		Large Beneficial			
ACCESSIBILITY	Community Severance	A bypass would remove the existing severance which may be felt in Dungiven through the removal of a large proportion of traffic. The bypass will also improve traffic noise and road safety fears and improve neighbourhood lifestyle and interaction possibilities. There are also implications for severance relating to the public access historic site which will be bisected by the cyan route. The public right of way will also be severed, and the footbridge river crossing will no longer be necessary. The relief from community severance within Dungiven and from the access routes to Dungiven Priory, this option is one of the preferred options in terms of severance, with a moderately positive effect.	Approx; 10 community facilities may be affected		Moderate Beneficial			
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed scheme which will improve journey times and the reliability of the current bus services in place which serve both the Dungiven and Foreglen areas. Fewer queues will aid buses to keep to their timetables and provide efficient cross over for multiple services.	N/A		Slight Beneficial			
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A		Neutral			
	Land Use Planning	There is no notable loss of zoned land. Identification of several areas of constraint on mineral developments within section 2 of the proposed scheme. There will be a moderate adverse impact on the Dungiven Priory Scheduled Monument and the standing Stone Scheduled Monument. May also impact on the access to Dungiven Priory.	N/A		Moderate Adverse			
	Other Government Policies (Social Inclusion and Local Economic Development)	In terms of Social Inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times.	N/A		Slight Beneficial			
Overall Economic Assessment including Accident Benefits			Central Growth	PVC	PVB	NPV	BCR	
				£68.623 M	£110.463 M	£41.480 M	1.610	

Option – Purple Section 2		Description - online in the western portion of Section 2, diverts offline to the south, rejoining the existing A6 alignment to the east of Crebarkey Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £136.969m																																																							
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options.</p> <p>Overall the yellow option results in an improvement in air quality with regard to PM₁₀ concentrations in 2016;</p> <p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p>	<p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Purple</td> <td>-980.6</td> <td>-178.3</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td>Do Minimum</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Purple</td> <td>76</td> <td>2%</td> <td>12</td> <td>1%</td> <td>67</td> <td>6%</td> <td>1.7</td> <td>7%</td> <td>7522</td> <td>7%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Purple	-980.6	-178.3		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Purple	76	2%	12	1%	67	6%	1.7	7%	7522	7%	<p>Local Air Quality - Major Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Purple	-980.6	-178.3																																																								
		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																					
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Purple	76	2%	12	1%	67	6%	1.7	7%	7522	7%																																																	
Cultural Heritage	<p>The Purple Route for impacts upon ten archaeological sites including direct physical impacts upon archaeological and historic landscape features and visual impacts upon the setting of a listed building, a standing stone and a flax mill.</p> <p>The removal of a number of features will have an adverse impact upon the complexity of the archaeology of the area.</p> <p>Several sites would be damaged or removed and therefore there would be an adverse impact upon the period of these sites.</p>	<p>The Purple Route impacts upon 10 archaeological sites; 7 of these impacts are direct physical impacts upon archaeological and historic landscape features and 3 comprise visual impacts upon the setting of a listed building, a standing stone and a flax mill.</p>	Moderate Adverse																																																								
Disruption due to Construction	<p>The Purple Route passes within 100 m of the three sensitive properties including the church, school and community centre in Foreglen and will involve exposure of premises to the noise and dust associated with construction processes.</p> <p>This option is likely to have a severe impact on the existing road network as it is the option that influences a number of properties and access to these properties.</p> <p>Provision of temporary crossing points for pedestrians and cyclists, is of particular importance as the Purple Route passes through the middle of Foreglen, severing residents from community facilities such as the church, and crossing the NCN Route 93. Bus journey routes and bus stops may be affected along the existing A6 during the proposed works.</p> <p>The Purple Route may impact on local wildlife through disturbance, mostly caused by noise, vibration and visual disturbance.</p>	<p>The proposed works for the construction phase of the Purple Route will be within 100 m of 138 properties in total. Of these properties, approximately 123 fall within the vicinity of Foreglen, and approximately 15 properties fall within the section between Claudy and the west of Foreglen.</p> <p>The Purple Route passes within 100 m of the three sensitive properties including the church, school and community centre in Foreglen.</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the Foreglen River and Wood Burn. Both rivers are classified as salmonid under the Freshwater Fish Directive. The adverse effect on salmon populations in the Wood Burn is rated as lower because the crossing is near the headwaters of the river. Additional impacts of the proposed route will be on improved, semi-improved and arable farmland. Short lengths of the route will impact upon sites that are of greater biodiversity interest.</p> <p>The scheme would impact upon a small area of species-rich marshy grassland. Hedgerows that will be affected by the works are of low botanical interest, but record historical continuity of the local field pattern.</p> <p>Although no evidence of otters was found in the limited survey carried out to date in the immediate vicinity of the Route, it is clear that the species is present within the Faughan catchment and it is likely that the Foreglen River and the Wood Burn are both used by otters to an unknown extent. Potential impacts on the species include disturbance to breeding and feeding activities, adverse effects on prey species through disturbance and pollution of the river waters, and increased mortality due to diversion of dispersing or hunting animals across roads as a result of works activities.</p> <p>A dedicated badger survey is ongoing, but it is known that badgers occur in the general vicinity of the Route.</p> <p>A dedicated bat survey has yet to be carried out, but it is assumed at this stage that bats are present .corridor.</p>	N/A	Slight Adverse																																																								
Landscape Effects	<p>Impacts would be largely the same as the Yellow Route, except for the off line section at Murreery. This section traverses a small upland to the immediate south of the existing A6, still within the area comprised primarily of development associated with the A6 and Foreglen.</p>	N/A	Minor Adverse																																																								

Option – Purple Section 2		Description - online in the western portion of Section 2, diverts offline to the south, rejoining the existing A6 alignment to the east of Crebarkey Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £136.969m										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		In comparison with the yellow route the purple route is less attractive in that its offline section increases the extent of build development and thereby detracts from what rural landscape remains in the immediate environs of Foreglen.												
	Land Use	The Purple Route will result in a loss of community land arising from encroachment on existing community facilities in Foreglen. Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.	The Purple Route will result in 14 required demolitions, with 6 residential, 6 commercial and 2 other demolition. Purple Route will result in a small community land take (308m ²) and will result in the loss of 4269 m ² of development land. The Purple Route does not impact on land which is considered BMV land, however it will affect 34 landowners.	Minor Adverse										
	Noise and Vibration	In terms of vibration the Purple Route will result in a reduction several properties potentially affected by vibration. Few properties will experience an increase in vibration. The Purple route results in an area adversely affected by noise. Additionally there is a significant area that will experience noise reductions of at least 1dB or more.	Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option L _{A10} versus Do-Minimum L _{A10}) <table border="1"> <thead> <tr> <th></th> <th>Number of Residential Properties</th> </tr> </thead> <tbody> <tr> <td>Significance of Impact</td> <td>Purple Route Option</td> </tr> <tr> <td>Slight/ Moderate Adverse or worse</td> <td>74</td> </tr> <tr> <td>Slight/ Moderate Beneficial or Better</td> <td>126</td> </tr> <tr> <td>Ratio of 1dB or More Changes</td> <td>1.7</td> </tr> </tbody> </table>		Number of Residential Properties	Significance of Impact	Purple Route Option	Slight/ Moderate Adverse or worse	74	Slight/ Moderate Beneficial or Better	126	Ratio of 1dB or More Changes	1.7	Slight Beneficial
	Number of Residential Properties													
Significance of Impact	Purple Route Option													
Slight/ Moderate Adverse or worse	74													
Slight/ Moderate Beneficial or Better	126													
Ratio of 1dB or More Changes	1.7													
	Pedestrians, Cyclists, Equestrians and Community Effects	No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the surveys undertaken indicated that most NMU journeys will be in the vicinity of a proposed junction and therefore a minimal journey length change is expected There will be a slight increase in journey length, however it is unlikely to deter people from continuing as an NMU. This option is likely to improve the safety or amenity value for NMUs, if NMU facilities are included on the proposed Ballyhanedin Road junction. However, along the remainder of the route in this area, NMU movements will be confined to the existing A6, as pedestrian access will be severely limited to the proposed A6 dualling schemes. This option is mostly online and so amenity may not change significantly, except that better road furniture would be expected to improve safety for people along the road edge.	Slight alterations to NMU journey lengths are expected, such as those to Dungiven Priory, however, the difference in journey lengths us likely to be within the order of 1 to 2 minutes	Substantial Beneficial										
	Vehicle Travellers	For the Purple Route views will generally range from intermittent to open. Views from the road around Foreglen will remain the same and as the route dips offline at a point where the existing A6 has good views, no change will be expected. The views for the offline section range from intermittent to open depending on roadside hedgerows and trees. The view from road for the junctions at Ballyhanedin Road and Altlover Road will remain intermittent / open with views of open space, hills and agricultural land. However, the bridges proposed as part of these junctions are likely to restrict the existing views. The Purple Route will result in moderate levels of frustration for vehicle travellers. Frustration associated with high traffic volumes, congestion and vehicles accessing and egressing from the existing junctions will be reduced, as the new junctions should allow more efficient traffic movement. The proposed Altlover Road junction will reduce fear of accidents. However, factors increasing the fear of potential accidents will be parked cars, pedestrians and vulnerable road users where the proposed route passes through Foreglen. The fear of accidents as a result of this proposed option will be reduced compared to the existing alignment, but would remain low to moderate.	N/A.	Large Beneficial										
	Road Drainage and the Water Environment	During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. The same impacts are predicted to be insignificant for minor watercourses. During the operation phase however, there is the potential for significant beneficial impacts on	N/A	Moderate Adverse										

Option – Purple Section 2		Description - online in the western portion of Section 2, diverts offline to the south, rejoining the existing A6 alignment to the east of Crebarkey Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £136.969m																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		receiving watercourses due to the provision of new treatment and spillage containment facilities. Surface water impacts will need to be considered in the development of proposals for bridging watercourses and in the development of treatment proposals at the detailed design stage. There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant.																											
	Geology and Soils	The route lies within 100 m of contaminated land site, a former petrol station / fuel storage area, with a potential for release of hydrocarbons from contaminated soils as a result of disturbance during construction. The route is adjacent to contaminated land site, described as reclaimed land, now mainly occupied by a dwelling and associated gardens. Disturbance of the site has the potential to release any entrained contaminants into the environment, but is unlikely to present a significant risk to construction. The route is adjacent to contaminated land site, also described as reclaimed land. Disturbance of the site has the potential to release any entrained contaminants into the environment, but is unlikely to present a significant risk to construction.	There are 0 fields infested with PWD or PCN along the route corridor.	Slight Adverse																									
	Impact of Road Schemes on Policies and Plans	The Purple Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012. The route will improve passenger journeys and freight transport links between Belfast and Londonderry. The Purple Route will allow better and safer access and egress from minor roads such as Ballyhanedin Road and Altmover Road onto the A6. However, it is a predominately online option and as a result is not likely to improve crossing facilities at Foreglen.	Effect of the Proposed Purple Route on Policies and Plans. <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>6</td> <td>4</td> <td>4</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>36</td> <td>41</td> <td>11</td> <td>1</td> </tr> <tr> <td>Local</td> <td>3</td> <td>25</td> <td>0</td> <td>0</td> </tr> <tr> <td>Total</td> <td>45</td> <td>70</td> <td>15</td> <td>1</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	6	4	4	0	Regional	36	41	11	1	Local	3	25	0	0	Total	45	70	15	1	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	6	4	4	0																									
Regional	36	41	11	1																									
Local	3	25	0	0																									
Total	45	70	15	1																									
SAFETY	Accidents	The majority of this option is offline dual carriageway and as such will provide safety benefits, because of its improved standard of the road and the separation of strategic and local traffic.	Total Number of Link and Junction Accidents: -209.9 Number of Link and Junction Fatalities: -2.7 Number of Link and Junction Serious: -26.2 Number of Link and Junction Slight: -301.4	Accidents PVB: -£8.045m																									
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user-costs that would result from the construction of the Do-Something scheme. The TEE table shows positive net benefits to consumer, business and private users with an overall benefit of £53.833m. Dis- benefits were shown by Accidents and Emissions overall at £8.511m. The overall PVB was a benefit of £71.474m	Total Vehicle Hours Saved: Do Min Total Vehicle Hours: 71,857 Do Something Total Vehicle Hours: 58,207 Total Vehicle Hours Saved: 13,650	TEE Table Consumer PVB: £25.085 Business PVB: £28.734 Private PVB: 0.014 Emissions PVB: -£0.466 Operating PVC: £1.580 Investment PVC: £113.256																									
	Reliability	The bypass will increase the reliability of journey times. The purple route is an offline option with a bypass and online dualling only in small sections which yields more reliable journey times for drivers, passengers and freight.	N/A	Large Beneficial																									
ACCESSIBILITY	Community Severance	A bypass would remove the existing severance which may be felt in Dungiven through the removal of a large proportion of traffic. The bypass will also improve traffic noise and road safety fears and improve neighbourhood lifestyle and interaction possibilities. Provides relief from community severance within Dungiven, and from the access routes to Dungiven Priory, this option is one of the preferred options in terms of severance, with a moderately positive effects	Approx; 10 community facilities may be affected	Moderate Beneficial																									
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed scheme which will improve journey times and the reliability of the current bus services in place which serve both the Dungiven and Foreglen areas. Fewer queues will aid buses to keep to their timetables and provide efficient cross over for multiple services.	N/A	Slight Beneficial																									

Option – Purple Section 2		Description - online in the western portion of Section 2, diverts offline to the south, rejoining the existing A6 alignment to the east of Crebarkey Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.			Present Value Cost £136.969m		
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT			ASSESSMENT		
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A			Neutral		
	Land Use Planning	There is no notable loss of zoned land. Identification of several areas of constraint on mineral developments within section 2 or the proposed scheme. May have an adverse impact on the Dungiven Priory Scheduled Monument and the Standing Stone Scheduled Monument.	N/A			Moderate Adverse		
	Other Government Policies	In terms of social inclusion the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times.	N/A			Slight Beneficial		
Overall Economic Assessment including Accident Benefits			Central Growth	PVC	PVB	NPV	BCR	
				£110.869 M	£45.321 M	-£60.548	0.409	

Option – Red Section 2	Description - Red Route- starts offline to the south of the existing A6 and runs parallel to the existing A6 up to Feeny Road, passing Dernaflaw, diverts further offline to the south of Dungiven with a bridge over Magheramore Road, rejoins the existing A6 at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £94.435 M																																																								
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																																																							
ENVIRONMENT	Air Quality	<p>The Assessment Scores generated by the Local Assessment of air quality show an overall beneficial impact with regard to exposure to NO₂ and PM₁₀ for all proposed options.</p> <p>The Local Assessment Scores for the Red Route indicate a marginally reduced improvement in air quality compared with the other routes. This route option follows the same path in Section 1, however it passes closer to the village of Dernaflaw in Section 2 (approximately 100 m away), thus having a greater impact upon properties in the village, when compared to the other routes.</p> <p>The results of the Regional Assessment indicate that total emissions of carbon monoxide, hydrocarbons, NO_x, PM₁₀ and carbon across the road network considered will increase, should any of the proposed dualling options go ahead. The Red Route shows the greatest increases in total emissions.</p> <p>The results of the greenhouse gas emissions assessment indicate that total emissions of carbon across the road network considered will increase, should any of the proposed dualling options go ahead.</p>	<p>Summary of Local Assessment Scores for all options in 2016.</p> <table border="1"> <thead> <tr> <th rowspan="2">ROUTE OPTION</th> <th colspan="2">NET TOTAL ASSESSMENT FOR ALL ROUTES</th> </tr> <tr> <th>NO₂</th> <th>PM₁₀</th> </tr> </thead> <tbody> <tr> <td>Red</td> <td>-1073.8</td> <td>-201.1</td> </tr> </tbody> </table> <p>Summary of emissions from road network calculated in Regional Assessment (emissions in tonnes and percentage impact).</p> <table border="1"> <thead> <tr> <th></th> <th>CARBON MONOXIDE</th> <th>TOTAL HYDROCARBONS</th> <th>NO_x</th> <th>PM₁₀</th> <th>TOTAL CARBON</th> </tr> </thead> <tbody> <tr> <td colspan="6">Do Minimum</td> </tr> <tr> <td>2008</td> <td>69</td> <td>11</td> <td>88</td> <td>2.4</td> <td>6049</td> </tr> <tr> <td>2016</td> <td>74</td> <td>12</td> <td>63</td> <td>1.6</td> <td>7060</td> </tr> <tr> <td>2031</td> <td>85</td> <td>14</td> <td>68</td> <td>1.8</td> <td>7998</td> </tr> <tr> <td colspan="6">2016 Do Something (% relative to 2016 Do Minimum)</td> </tr> <tr> <td>Red</td> <td>76</td> <td>2%</td> <td>12</td> <td>2%</td> <td>68</td> <td>8%</td> <td>1.7</td> <td>10%</td> <td>7638</td> <td>8%</td> </tr> </tbody> </table>	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES		NO ₂	PM ₁₀	Red	-1073.8	-201.1		CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON	Do Minimum						2008	69	11	88	2.4	6049	2016	74	12	63	1.6	7060	2031	85	14	68	1.8	7998	2016 Do Something (% relative to 2016 Do Minimum)						Red	76	2%	12	2%	68	8%	1.7	10%	7638	8%	<p>Local Air Quality - Major Beneficial</p> <p>Regional Air Quality - Minor Adverse</p> <p>Greenhouse Gases - Minor Adverse</p>
	ROUTE OPTION	NET TOTAL ASSESSMENT FOR ALL ROUTES																																																									
		NO ₂	PM ₁₀																																																								
	Red	-1073.8	-201.1																																																								
	CARBON MONOXIDE	TOTAL HYDROCARBONS	NO _x	PM ₁₀	TOTAL CARBON																																																						
Do Minimum																																																											
2008	69	11	88	2.4	6049																																																						
2016	74	12	63	1.6	7060																																																						
2031	85	14	68	1.8	7998																																																						
2016 Do Something (% relative to 2016 Do Minimum)																																																											
Red	76	2%	12	2%	68	8%	1.7	10%	7638	8%																																																	
Cultural Heritage	<p>The Red Route Option will impact upon the condition of several of the recorded archaeological sites.</p> <p>Several sites would be damaged or removed and therefore there would be an adverse impact upon the archaeological periods of the area.</p>	<p>There are a total of 13 recorded archaeological sites affected by the Red Route; 10 of these comprise direct physical impacts and 3 comprise visual effects. These include visual impacts upon the setting of 2 Scheduled Monuments, Dungiven Priory and a standing stone which may form part of a chambered tomb.</p>	Moderate Adverse																																																								
Disruption due to Construction	<p>As much of this route is off-line, the new road could therefore be constructed with minimal disruption to traffic. The Red Route only influences the existing A6 at the new proposed Feeny Road Junction and to the south east of Dungiven after the proposed new junction with the current A6. As a result effects on bus journeys and bus stops would be minimal.</p> <p>The Red Route will have an impact on the setting of the Dungiven Priory and Standing Stone Scheduled Monuments.</p> <p>The Red Route crosses over the Owenbeg River and the River Roe. Thus there is potential to cause pollution during the construction phase.</p> <p>The route may also cause disruption where it crosses minor roads to the south of Dungiven.</p>	<p>The Red Route passes within 100 m of 77 properties, including a church, a school and a GAA centre. The majority of these properties are within Dernaflaw, as the Red Route passes approximately 200 metres south of the current A6 and remains offline until the eastern end of Dungiven. This route crosses several relatively minor local roads and a B-class road leading towards Feeny (B74).</p>	Slight Adverse																																																								
Ecology and Nature Conservation	<p>The proposed route crosses the River Roe & Tributaries SAC.</p> <p>Additional impacts of the proposed route will be on improved, semi-improved and arable farmland, none of which is of high botanical interest.</p> <p>Short lengths of the route will impact upon sites that are of greater biodiversity interest.</p> <p>The scheme would impact upon a small area of species-rich semi natural woodland, but a minor route realignment at this point to avoid the woodland and SAC should result in a neutral impact on the habitat/SAC.</p> <p>A number of hedgerows that will be affected by the works are species-rich and likely to be of a considerable age and local historical and ecological significance.</p> <p>Mammal surveys have yet to be completed along the route, but it is likely that otters, badgers and bats all occur within the route corridor.</p>	N/A	Very Large Adverse																																																								
Landscape Effects	<p>This route is largely parallel to the south of the current A6. It commences offline and requires a large cutting south of Dernaflaw and a large embankment at the Feeny Road. The presence of the new road close to the existing road would have long term negative effects in forming a highway- dominated corridor of land within this part of the Roe Basin; although some mitigation would be possible through planting, this would have long term impacts. The</p>	N/A	Moderate Adverse																																																								

Option – Red Section 2		Description - Red Route- starts offline to the south of the existing A6 and runs parallel to the existing A6 up to Feeny Road, passing Dernaflaw, diverts further offline to the south of Dungiven with a bridge over Magheramore Road, rejoins the existing A6 at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £94.435 M										
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT										
		effects on the Roe Valley/Priory area would be similar in effect to the Cyan route. After completion the impacts would be Major Adverse both within LCZ 3 and 4. After 15 years the impacts would be broadly similar on the Roe Valley Area environs as the Cyan Route, though locally more adverse on the setting of the standing stone, as it will be closer the stone than the cyan route with larger embankments as it crosses the River Roe. It is considered that impacts would be Moderate Adverse impact across the wider zone though locally Major Adverse on the standing stone and Priory area.												
	Land Use	Due to the large area of land which is defined as agricultural land, avoidance is not feasible. However in an attempt to minimise farm severance, access can be included in the final design, to ensure agricultural activity can be maintained and be segregated from road traffic.	The Red Route will result in 15 demolitions (including a grade separated junction) or 9 demolitions (including a roundabout). It will also result in a residential land take of 6476m ² (including a grade separated junction)/ 3346 m ² (including a roundabout). The Red Option will result in the greatest community land take, bisecting the Derry County GAA pitches (26414 m ² including a grade separated junction or 24475 m ² including a roundabout). The Red Route will result in the removal of 7248 m ² (including a grade separated junction) of development land or 9824 m ² (including a roundabout). The Red Route will result in 178706 m ² of BMV land loss if a grade separated junction is included and will affect 20 landowners or 182303 m ² if a roundabout is included and will affect 21 landowners.	Slight Adverse										
	Noise and Vibration	In terms of vibration the Red Route will result in a reduction of several properties potentially affected by vibration. The Red Route results in an area adversely affected by noise. There is a large increase in the overall community area that will experience an increase of at least 1dB or more in noise.	Core Study Area, Year of Opening, Summary of Residential Significance of Impacts (Route Option L _{A10} versus Do-Minimum L _{A10}) <table border="1"><thead><tr><th></th><th>Number of Residential Properties</th></tr></thead><tbody><tr><td>Significance of Impact</td><td>Red Route Option</td></tr><tr><td>Slight/ Moderate Adverse or worse</td><td>326</td></tr><tr><td>Slight/ Moderate Beneficial or Better</td><td>263</td></tr><tr><td>Ratio of 1dB or More Changes</td><td>0.8</td></tr></tbody></table>		Number of Residential Properties	Significance of Impact	Red Route Option	Slight/ Moderate Adverse or worse	326	Slight/ Moderate Beneficial or Better	263	Ratio of 1dB or More Changes	0.8	Slight Adverse
	Number of Residential Properties													
Significance of Impact	Red Route Option													
Slight/ Moderate Adverse or worse	326													
Slight/ Moderate Beneficial or Better	263													
Ratio of 1dB or More Changes	0.8													
	Pedestrians, Cyclists, Equestrians and Community Effects	No significant change in the journey length being undertaken by pedestrians or cyclists is expected as the Red Route is offline compared to the existing A6 and alternative means of crossing under or over the new road are proposed for existing NMU routes. The Red Route results in a moderate positive change in severance, as it is predominantly offline, but does disrupt NMU routes in close proximity to Dungiven (e.g. the route to the Dungiven Priory). The majority of benefits are observed through the centre of Dungiven and Dernaflaw as the route is offline in this area, resulting in a substantial reduction in severance for these communities. This discussion of severance has not, however, considered the disruption to existing community sports facilities in Foreglen.	No Slight alterations to NMU journey lengths are expected, such as those to Dungiven Priory, however, the difference in journey length is likely to be within the order of 1 to 2 minutes.	Slight Beneficial										
	Vehicle Travellers	The views will be more rural and the view from the road will be intermittent / open with views of open space, hills and agricultural land. The proposed junction with Feeny Road may restrict the viewshed briefly for drivers. The Red Route will bypass Main Street (Dungiven) taking vehicle travellers out of a built up area into more open space. This will open up views and as a result the view from the road would change from restricted to intermittent and open. This option should substantially reduce frustration as it diverts traffic around Dungiven Main Street and south of Dernaflaw. The fear of accidents should be substantially reduced by the Red Route as it diverts the majority of traffic onto the through route to the south of Dernaflaw and Dungiven. The proposed junction will be safer as it is comprised of roundabouts and slip roads. Conditions will also improve in Dungiven (on Main Street and Chapel Road) as traffic flows will be	N/A.	Large Beneficial										

Option – Red Section 2		Description - Red Route- starts offline to the south of the existing A6 and runs parallel to the existing A6 up to Feeny Road, passing Dernaflaw, diverts further offline to the south of Dungiven with a bridge over Magheramore Road, rejoins the existing A6 at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.	Present Value Cost £94.435 M																									
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT	ASSESSMENT																									
		reduced as a result of the proposed grade separated junction or roundabout at Chapel Road. As this option is primarily offline, it will cause route uncertainty for local travellers who are attempting to reach locations within Dernaflaw and Dungiven.																											
	Road Drainage and the Water Environment	During the construction phase minor adverse to negligible impacts from erosion, sediment rich runoff and chemical spillages, although temporary and short term, could have significant to low adverse impacts on those watercourses that are considered to be of very high importance. During the operation phase there is the potential for significant beneficial impacts on receiving watercourses due to the provision of new treatment and spillage containment facilities. There is the potential for a significant beneficial impact from the removal of the risk of contamination from Made Ground with other construction impacts on groundwater predicted to be insignificant. Impacts to groundwater resources during the operation phase are also considered to be insignificant. With regards flood risk, construction impacts range between insignificant and highly adverse significance. Highly adverse impacts may occur when works are close to the River Roe. Other less significant adverse impacts could occur as a result of blockages to watercourses. During operation there is the potential for very significant adverse impacts to the River Roe and significant adverse impacts to the Owenbeg River.	N/A	Moderate Adverse																									
	Geology and Soils	A short stretch of the Red Route passes through BMV agricultural land at the extreme eastern end of the route, and more extensively to the southwest of Dungiven. The route passes within approximately 100 m of contaminated land site, a sewage works. This site is unlikely to present a significant risk to construction. The route crosses a former sand / gravel pit. This land has been reclaimed for agriculture and is unlikely to present a significant risk to construction. An adjacent depot with covered tanks also lies within the route footprint; disturbance of this site has the potential to release any entrained contaminants into the environment. The route passes within 100 m of contaminated land site, described as mineral workings. This land has been reclaimed for agriculture and is unlikely to present a significant risk to construction. The route lies adjacent to licensed area of mineral extraction, which is currently in agricultural use.	There are 0 fields infested with PWD or PCN along the route corridor	Slight Adverse																									
	Impact of Road Schemes on Policies and Plans	The Red Route conforms to the policies set out in the Regional Development Strategy for Northern Ireland 2025 and its 'daughter' document, the Regional Transportation Strategy for Northern Ireland 2002 – 2012. The Red Route will improve regional transport links between Londonderry and Dungiven, and will improve reliability of journey times. More specifically, it will remove traffic away from Dernaflaw making it easier to walk within the community. The Red Route will also remove traffic from Main Street in Dungiven resulting in better air quality, for Dungiven Town Centre and making it easier to walk and cycle, all of which comply with the 'White Paper: A New Deal for Transport: Better for Everyone' (1998). It will however, infringe upon the area of green belt which has been designated around Dungiven by Policy GB_CPA1 Designation of Greenbelts and Countryside Policy Areas, in 'A Planning strategy for Rural Northern Ireland' and superseded by 'PPS 21: Sustainable Development in the Countryside' . This route will also bisect the area between Dungiven Priory and a Standing Stone (Scheduled Monument) (Policy BH 1 The Preservation of Archaeological Remains of Regional Importance and their Settings).	Effect of the Proposed Red Route on Policies and Plans. <table border="1"> <thead> <tr> <th>Policy Level</th> <th>Compliant</th> <th>Compliant (with mitigation)</th> <th>Neutral</th> <th>Non-compliant</th> </tr> </thead> <tbody> <tr> <td>National</td> <td>7</td> <td>6</td> <td>1</td> <td>0</td> </tr> <tr> <td>Regional</td> <td>34</td> <td>43</td> <td>11</td> <td>1</td> </tr> <tr> <td>Local</td> <td>2</td> <td>25</td> <td>0</td> <td>1</td> </tr> <tr> <td>Total</td> <td>43</td> <td>74</td> <td>12</td> <td>2</td> </tr> </tbody> </table>	Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant	National	7	6	1	0	Regional	34	43	11	1	Local	2	25	0	1	Total	43	74	12	2	Beneficial
Policy Level	Compliant	Compliant (with mitigation)	Neutral	Non-compliant																									
National	7	6	1	0																									
Regional	34	43	11	1																									
Local	2	25	0	1																									
Total	43	74	12	2																									

Option – Red Section 2		Description - Red Route- starts offline to the south of the existing A6 and runs parallel to the existing A6 up to Feeny Road, passing Dernaflaw, diverts further offline to the south of Dungiven with a bridge over Magheramore Road, rejoins the existing A6 at Chapel Road.	Problems – The A6 is a predominately a single carriageway which connects Belfast to Londonderry, via Toome, Maghera and Dungiven and is designated as a Key Transport Corridor. The existing A6 is a rural single carriageway and congestion occurs at certain times of the day. In particular, Dungiven suffers from congestions during peak periods. Unreliable journey times due to a lack of overtaking opportunities along the Key Transport Corridor and the effects of heavy through traffic in local communities.		Present Value Cost £94.435 M			
OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE ASSESSMENT		ASSESSMENT			
SAFETY	Accidents	The majority of this option is offline dual carriageway and as such will provide safety benefits, because of its improved standard of the road and the separation of strategic and local traffic.	Total Number of Link and Junction Accidents: -170.5 Number of Link and Junction Fatalities: 0.6 Number of Link and Junction Serious: -10.8 Number of Link and Junction Slight: -258.0		Accidents PVB: -£3.771m			
ECONOMY	Transport Economic Efficiency	The PVB represents the reduction in user-costs that would result from the construction of the Do-Something scheme. The TEE table shows positive net benefits to consumer, business and private users with an overall benefit of £78.504m. Accidents and Emissions show a combined dis-benefit of £4.031m. Overall PVB is a positive £71.474	Total Vehicle Hours Saved: Do Min Total Vehicle Hours: 71,857 Do Something Total Vehicle Hours: 55,421 Total Vehicle Hours Saved: 16,437		TEE Table Consumer PVB: £36.780m Business PVB: £41.550m Private PVB: £0.174m Emissions PVB: -£0.260m Operating + ITR PVC: £0.854m Investment PVC: £82.182m			
	Reliability	The bypass will increase the reliability of journey times. The red route is an offline option with a bypass and online dualling only in small sections which yields more reliable journey times for drivers, passengers and freight.	N/A		Large Beneficial			
ACCESSIBILITY	Community Severance	A bypass would remove the existing severance which may be felt in Dungiven through the removal of a large proportion of traffic. The bypass will also improve traffic noise and road safety fears and improve neighbourhood lifestyle and interaction possibilities. In addition, the max AADT for the Red Route in Section 2 for 2016 is expected to be between 10,000 and 18,900 vehicles per day. According to the DMRB guidelines, if pedestrians cross a new road carrying over 16,000 vehicles per day (AADT) at grade, this would lead to a 'severe' degree of severance. It is, however, likely that access to these sites will be on over-bridges, or NMU facilities would be incorporated into the design if this route was selected as the preferred option. These details are currently unavailable, but incorporation of these facilities would reduce the overall severance to a moderate degree of community severance.	Approx; 10 community facilities may be affected		Slight Adverse			
	Access to the Transport System	For those without a private vehicle, public transport travel speeds will be improved by the removal of through traffic via the proposed route.	N/A		Slight Beneficial			
INTEGRATION	Transport Interchange	There are no significant changes or benefits to the existing transport system as no interchanges have been created.	N/A		Neutral			
	Land Use Planning	There is no notable loss of zoned land. The identification of several areas of constraint on mineral developments with section 2 of the proposed scheme. This route may have an adverse impact on Dungiven Priory Scheduled Monument and the Standing Stone Scheduled Monument. A number of community facilities may be affected by the Red Route as well as the Dungiven Priory access.	N/A		Moderate Adverse			
	Other Government Policies (Social Inclusion and Local Economic Development)	In terms of social inclusion, the proposal will promote regional balance by increasing accessibility to and from the study area. In terms of economic development, investment infrastructure will help improve competitiveness of business through improved journey times	N/A		Slight Beneficial			
Overall Economic Assessment including Accident Benefits			Central Growth	PVC	PVB	NPV	BCR	
				£81.328 M	£74.474 M	£6.855 M	0.916	