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York Street Interchange



Co-financed by the European Union
Trans-European Transport Network (TEN-T)

Proposed Scheme Report: Part 1 Environmental Statement

Volume 1: Environmental Assessment

January 2015



**INVESTORS
IN PEOPLE**

Rev	Date	Details	Prepared by	Checked by	Approved by
0	27 Jan. 2015	Final Issue	Glenn McKay Senior Assistant Environmental Engineer Ruth Beattie Assistant Environmental Scientist Mathew Hill Graduate Air Quality Specialist Andrew Copp Senior Archaeological Consultant Dr Paul Lynas Senior Ecologist Christina Todd Landscape Architect Robert Colder Acoustic Consultant Peter Gray Chartered Civil Engineer (Drainage) Alex Staton Principal Consultant (Geotechnical) Michael Gillespie Environmental Scientist Shauna Woods Town Planner	Gareth Coughlin Associate (Environment Team Leader) Glenn McKay Senior Assistant Environmental Engineer John McBride Senior Engineer (Roads) Garry Gray Associate (Air Quality) Neil Macnab Associate (Heritage) Paul Tully Technical Director (Landscape) Alf Maneylaws (Associate) Noise and Vibration Gabriel Gallagher Associate (Geotechnical) Philip Heyburn Associate (Drainage) Una Somerville Associate (Town Planner)	Gareth Coughlin Associate (Environment Team Leader) Michael Megarry Associate (Project Manager)

URS

Beechill House
 40 Beechill Road
 Belfast
 BT8 7RP

Telephone: +44(0)28 9070 5111
 Fax: +44(0)28 9079 5651
 www.ursglobal.com

Prepared for:

Transport NI
 Eastern Division
 Hydebank
 4 Hospital Road
 Belfast
 BT8 8JL



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URS Project Number

URS project number (up to 31 May 2011): S105296

URS project number (from 31 May 2011): 47037827

About Transport NI

Transport NI, formerly branded as Roads Service, is a business unit within the Department for Regional Development (DRD), playing a significant role in facilitating the safe and convenient movement of people and goods throughout the province and the safety of road users, through the delivery of road maintenance services and the management and development of the transport network. It also informs the Department's policy development process to ensure that measures to encourage safe and sustainable travel are practical and can be delivered.

Transport NI is responsible for the maintenance of over 25,000km of public roads together with about 9,700km of footways, 5,800 bridges, 271,000 street lights and 367 public car parks. It also has responsibility for the development of the transport network and a range of transport projects designed to improve network safety, sustainability and efficiency.

The key objectives of Transport NI are to:

- Manage, maintain and improve the transport network to keep it safe, efficient, reliable and sustainable;
- Promote increased customer satisfaction with the services delivered by Transport NI;
- Work constructively with Transport NI's key stakeholders to support the delivery of high quality services;
- Develop Transport NI's capacity and capability to meet objectives;
- Ensure effective management of Transport NI's budget, assets and corporate governance arrangements; and
- Improve Transport NI's resilience in responding to emergencies.

For the purposes of this report, references to Transport NI shall be read as references to its former Roads Service brand.

Further information about Transport NI is available on the Department for Regional Development website, please visit www.drdni.gov.uk.

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LIST OF ABBREVIATIONS

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3D	Three dimensional
AADT	Annual Average Daily Traffic
AAWT	Annual Average Weekday Traffic
AD	Anno Domini
ADEPT	Association of Directors of Environment, Economy, Planning and Transport
AEP	Annual Exceedance Probability
AFBI	Agri-Food Biosciences Institute
AIES	Assessment of Implications on European Sites
AMIs	Advanced Motorway Indicators
AOD	Above Ordnance Datum
AONB	Area of Outstanding Natural Beauty
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQS	Air Quality Standards
AR	Arterial Route
ASSI	Area of Special Scientific Interest
ATC	Area of Townscape Character
BAP	Biodiversity Action Plan
BC	Before Christ
BCC	Belfast City Council
BELB	Belfast Education and Library Board
BEP	Bad Ecological Potential
BES	Bad Ecological Status
BGS	British Geological Survey
BHA	Belfast Harbour Area
BIP	Biodiversity Implementation Plan
BMA	Belfast Metropolitan Area

Abbreviations	
BMAP	Belfast Metropolitan Area Plan
BMTP	Belfast Metropolitan Transport Plan
BMUA	Belfast Metropolitan Urban Area
BNCR	Belfast & Northern Counties Railway
BoCCI	Birds of Conservation Concern Ireland
BRP	Bat Roost Potential
BRT	Belfast Rapid Transit
BS	British Standard
BTO	British Trust for Ornithology
CaCO ₃	Calcium Carbonate
CAFE	Clean Air for Europe
CBC	Common Bird Census
CC	City Centre
CDM	Construction Design Management
CEDaR	Centre for Environmental Data and Recording
CEF	Connecting Europe Facility
CEMP	Construction Environmental Management Plan
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CKD	Combined Kerb and Drainage
CLR	Contaminated Land Report
CNCC	Council for Nature Conservation and the Countryside
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
COBA	Cost Benefit Analysis
CoCP	Code of Construction Practice
COSHH	Control of Substances Hazardous to Health
CPT	Cone Penetration Test

Abbreviations	
CRTN	Calculation of Road Traffic Noise
CS	Characteristic Situation
CSM	Conceptual Site Model
CSO	Combined Sewer Overflow
DARD	Department of Agriculture & Rural Development
DBFO	Design, Build, Finance & Operate
DCAL	Department of Culture, Arts & Leisure
DETI	Department of Enterprise, Trade and Investment
DFP	Department of Finance and Personnel
DfT	Department for Transport
DIN	Dissolved Inorganic Nitrogen
DMRB	Design Manual for Road and Bridges
DOE	The Department of the Environment
DRD	Department for Regional Development
DSD	Department for Social Development
DTM	Digital Terrain Model
DVA	Driver & Vehicle Agency
DWD	Drinking Water Directive
DWG	Drinking Water Guideline
DWS	Drinking Water Standards
EC	European Commission / European Community
ECI	Early Contractor Involvement
EclA	Ecological Impact Assessment
ECoW	Ecological Clerk of Works
EEC	European Economic Community
EFT	Emissions Factor Toolkit
EIA	Environmental Impact Assessment
EPS	European Protected Species

Abbreviations	
EQS	Environmental Quality Standards
ES	Environment Statement
ESCR	Earth Science Conservation Review
EU	European Union
FAB	Forum for Alternative Belfast
FSA	Food Standards Agency
GAC	Generic Assessment Criteria
GEP	Good Ecological Potential
GES	Good Ecological Status
GIR	Ground Investigation Report
GIS	Geographical Information Systems
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GOMMS	Guidance on the Methodology for Multi-Modal Studies
GPS	Global Positioning System
GQRA	Generic Quantitative Risk Assessment
GSNI	Geological Survey of Northern Ireland
GSV	Gas Screening Value
GWB	General Watching Brief
ha	hectare
HA	Highways Agency
HAWRAT	Highways Agency Water Risk Assessment Tool
HDV	Heavy Duty Vehicle
HES	High Ecological Status
HFS	High Friction Surfacing
HGV	Heavy Goods Vehicle
HPGD	Historic Park, Garden and Demesne
HRA	Habitats Regulations Assessment
HRA	Hot Rolled Asphalt

Abbreviations	
HSENI	Health and Safety Executive for Northern Ireland
IAN	Interim Advice Note
IAQM	Institute of Air Quality Management
IDP	Investment Delivery Plan
IEEM	Institute of Ecology and Environmental Management
IEMA	Institute of Environmental Management & Assessment
IfA	Institute for Archaeologists
INSTAR	Irish National Strategic Archaeological Research Programme
IROPI	Imperative Reasons of Overriding Public Interest
ISNI	Investment Strategy for Northern Ireland
ITS	Intelligent Transport Systems
IV	Intermittent View
JNCC	Joint Nature Conservation Committee
JR	Judicial Review
KTC	Key Transport Corridor
LAQM	Local Air Quality Management
LBAP	Local Biodiversity Action Plan
LCA	Landscape Character Area
LCT	Lagan Canal Trust
LDV	Light Duty Vehicle
LI	Landscape Institute
LiDAR	Light Detection and Ranging
LLPA	Local Landscape Policy Area
LMA	Local Management Area
LNR	Local Nature Reserve
LoLo	Lift-on / Lift-off
LPS	Land & Property Services
LTN	Local Transport Note

Abbreviations	
LVIA	Landscape & Visual Impact Assessment
LVRP	Lagan Valley Regional Park
MAC	Metropolitan Arts Centre
MBR	Monuments & Buildings Record
MEP	Moderate Ecological Potential
MES	Moderate Ecological Status
MPA	Mineral Products Association
MSFD	Marine Strategy Framework Directive
MUGA	Multi-use Games Area
NATA	New Approach To Appraisal
NB	North Belfast
NCN	National Cycle Network
NIAF	Northern Ireland Archaeology Forum
NIBG	Northern Ireland Bat Group
NIBS	Northern Ireland Biodiversity Strategy
NIEA	Northern Ireland Environment Agency
NIHE	Northern Ireland Housing Executive
NILCA	Northern Ireland Landscape Character Area
NNR	National Nature Reserve
NO ₂	Nitrogen dioxide
NO _x	Oxides of Nitrogen
NRTF	National Road Traffic Forecast
NV	No View
OS	Ordnance Survey
OSNI	Ordnance Survey of Northern Ireland
OV	Open View
PAH	Polycyclic Aromatic Hydrocarbons
PAW	Programme of Archaeological Works

Abbreviations	
PEP	Poor Ecological Potential
PES	Poor Ecological Status
PfG	Programme for Government
PI	Petrol Interceptor
PM	Particulate Matter
PPE	Personal Protective Equipment
PPS	Planning Policy Statement
PPV	Peak Particle Velocity
PRONI	Public Record Office of Northern Ireland
PRoW	Public Right of Way
PSNI	Police Service of Northern Ireland
PSSR	Preliminary Sources Study Report
PTZ	Pan Tilt and Zoom
RBMP	River Basin Management Plan
RDS	Regional Development Strategy
REAC	Register of Environmental Actions and Commitments
RG	Regional Guidance
RMSE	Root Mean Square Error
RoRo	Roll-on / Roll-off
RSPB	Royal Society for the Protection of Birds
RSPPG	Roads Service Policy and Procedure Guide
RSTN	Regional Strategic Transport Network
RSTN-TP	Regional Strategic Transport Network – Transport Plan
RTM	Remedial Targets Methodology
RTS	Regional Transportation Strategy
RV	Restricted View
SAC	Special Area of Conservation
SAM	Scheduled Archaeological Monument

Abbreviations	
SEA	Strategic Environmental Assessment
SEPA	Scottish Environmental Protection Agency
SFG	Spatial Framework Guidance
SHW	Specification for Highway Works
SLNCI	Site of Local Nature Conservation Importance
SO ₂	Sulphur dioxide
SPA	Special Protection Area
SPPS	Strategic Planning Policy Statement
SPR	Source – Pathway – Receptor
SRI	Strategic Road Improvements
SS	Suspended Solids
SuDS	Sustainable Drainage Systems
SVOC	Semi-Volatile Organic Compounds
SWMP	Site Waste Management Plan
TAG	Transport Analysis Guidance
TENs	Trans-European Network
TEN-T	Trans-European Network in Transport
TG	Technical Guidance
THC	Total Hydrocarbons
TICC	Traffic Information and Control Centre
TP	Trial Pit
TPH	Total Petroleum Hydrocarbons
TPO	Tree Preservation Order
TSCS	Thin Surface Course Systems
TTM	Temporary Traffic Management
TWB	Targeted Watching Brief
UCL	Upper Confidence Level
UK	United Kingdom

Abbreviations	
UKBAP	United Kingdom Biodiversity Action Plan
UKTAG	United Kingdom Technical Advisory Group
UTC	Urban Traffic Control
UV	Ultra violet
UWWT	Urban Waste Water Treatment
v/v	volume/volume
VCB	Vertical Concrete Barrier
VCSB	Variable Concrete Step Barrier
VES	Visual Effects Schedule
VOC	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WANE	Wildlife and Natural Environment Act
WEL	Workplace Exposure Limits
WFD	Water Framework Directive
WHO	World Health Organisation
WMU	Water Management Unit
WTV	Water Target Values
ZVI	Zone of Visual Influence

York Street Interchange



Co-financed by the European Union
Trans-European Transport Network (TEN-T)

Volume 1

Part I

Introduction

1. INTRODUCTION

1.1 Background

The Department for Regional Development (DRD) Transport NI proposes to construct the York Street Interchange ('the Proposed Scheme') as a long-term Strategic Road Improvement (SRI) to improve links between the A12 Westlink (the Westlink) and the M2 and M3 motorways in Belfast. The Proposed Scheme would provide a fully grade-separated interchange to replace the existing signalised gyratory junction. Interchange links between Westlink, M2 and M3 would be provided in underpasses aligned beneath new bridge structures at York Street and under the existing Dargan and Lagan bridges. The existing North Queen Street and Dock Street overbridges and Whitla Street subway structure would be widened as necessary to accommodate the new road layout, with another new overbridge structure proposed at Dock Street. Retaining walls and piled embankments would be provided as required to support new road alignments. Connections from the local road network to the new interchange links would be provided at Clifton Street, York Street, Dock Street and Duncrue Street in the form of on-slips. Connections from the strategic road network to the local road network would be provided in the form of off-slips from the interchange links at Clifton Street, York Street and Nelson Street. The existing north-facing on and off slip roads at Clifton Street would remain open within the proposed road layout.

The existing at-grade signalised York Street junction currently links Westlink to M2 and M3 through a complex arrangement of traffic signals that interface with the local road network, which includes York Street, York Link, Great George's Street and Nelson Street. The overall signalised "box" created by these four signalised junctions is known as the York Street junction gyratory system in which road users currently experience delays and congestion when travelling through, especially at peak periods.

A general location plan of the existing York Street junction relative to the surrounding strategic road network in the Belfast Metropolitan Area (BMA) is shown on Figure 1.1. The general study area is shown on Figure 1.2.

Transport NI has examined a range of strategies for future improvement of York Street junction. In 2008, URS (formerly Scott Wilson) was commissioned to assist in the development of the scheme to a point where a Preferred Option could be selected. This included completion of a number of scheme assessments in accordance with the procedures established by the Design Manual for Roads and Bridges (DMRB). These procedures require the assessment of engineering, environmental, traffic and economic advantages and disadvantages associated with the scheme, at various stages in the development process.

In 2009, URS completed its Stage 1 scheme assessment to broadly identify the advantages and disadvantages associated with a range of preliminary junction options. The findings from the assessment were reported in the '*Preliminary Options Report*' of March 2009, identifying that the improvements would provide significant benefits to the region. As endorsed by Transport NI, the report recommended shortlisting four of the six assessed preliminary options.

In October 2012, URS completed its Stage 2 scheme assessment to identify factors to be taken into account in the consideration of alternative interchange options and to identify environmental, engineering, economic and traffic advantages and disadvantages associated with these. The findings from the assessment were reported in the '*Preferred Options Report*' of October 2012, identifying that several options would present benefits to the region. As endorsed by Transport NI, the report recommended that Option C (a fully grade-separated interchange with links aligned in underpasses below existing ground level) be selected as the

Preferred Option for the scheme. The Minister for Regional Development subsequently made the public announcement of the Preferred Option for the scheme on 06th December 2012.

Following the announcement of the Preferred Option for the scheme, URS' commission was extended to include the preliminary design of the Proposed Scheme, undertake the statutory Environmental Impact Assessment (EIA) in accordance with the requirements of DMRB, and prepare draft Orders, specifically an Environmental Statement (ES), Designation Order (DO) and Vesting Order (VO). This major road improvement scheme would be delivered by Transport NI in accordance with the statutory procedures of the Roads (Northern Ireland) Order 1993 [as amended]. These are distinct from planning approval procedures and require Transport NI to prepare and publish an ES and draft Orders for consultation. Depending on the nature and number of responses, a Public Inquiry may be convened to determine if the scheme should proceed as planned.

1.2 Proposed Scheme Report Structure

This Proposed Scheme Report has been prepared in accordance with the general requirements for a Stage 3 Scheme Assessment Report, set out in DMRB TD 37/93 entitled '*Scheme Assessment Reporting*' (DMRB 5.1.2), the Project Brief, and Roads Service (Transport NI) Policy and Procedure Guide (RSPPG) E030 entitled "*Major Works Schemes: Inception to Completion*". In accordance with the requirements of the DMRB, the report has been structured into two distinct parts:

- Part 1 (this ES); and
- Part 2 (the Engineering, Traffic and Economic Assessment Report).

1.3 The Environmental Statement

The ES is a detailed report of the findings of the EIA process. In particular, it predicts the environmental effects that the Proposed Scheme would have, and details the measures proposed to reduce or eliminate those effects.

1.3.1 *Legal basis for the Environmental Statement*

The requirement to carry out a statutory EIA and publish an ES only applies to certain projects that are deemed to exceed certain thresholds and are predicted to have a significant effect on the environment.

The Planning Reform (Northern Ireland) Order 2006 ended the Crown's immunity from planning control. Crown bodies have to apply for planning permission like any other developer, unless a scheme is classified as 'permitted development' as defined by the Planning (General Development) Order (Northern Ireland) 1993 (as amended by the Planning (Application of Subordinate Legislation to the Crown) Order (Northern Ireland) 2006).

Part 22 of the Schedule to the Planning (General Development) Order (Northern Ireland) 1993 [as amended] describes permitted development rights exercisable by Transport NI for the purposes of roads undertakings. The Proposed Scheme qualifies as a Class A 'permitted development' under this schedule, as it would require carrying out road undertakings by or on behalf of the DRD:

- a) on land within the boundaries of a road, of any works required for the maintenance or improvement of the road; or
- b) on land outside but adjoining the boundary of an existing road, of works required for or incidental to the maintenance or improvement of the road.

For purpose of interpretation “improvement” means the improvement and safety of roads under Part IV of the Roads (Northern Ireland) Order 1993 [as amended]. Essentially the type of development now benefiting from permitted development rights in Northern Ireland include those given to certain types of organisations which carry out development, including councils and various statutory undertakers (i.e. DRD); these rights may have been given on the basis of the public services provided by these bodies and the statutory controls and accountability that apply to them.

This ES is therefore issued in accordance with European Communities (EC) Council Directive 85/337/EEC, as amended by EC Council Directive 97/11/EC and Directives No. 2003/35/EC & 2009/31/EC of the European Parliament and of the Council (hereafter referred to as the EIA Directive) and required by Part V of The Roads (Northern Ireland) Order 1993 as substituted by The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 and amended by The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 2007. The initial Directive of 1985 and its three amendments have been codified in Directive 2011/92/EU of 13 December 2011. Directive 2011/92/EU was amended by Directive 2014/52/EU which entered into force on 15th May 2014. Member States have to apply these rules from 16th May 2017 at the latest.

In line with legislative requirements, the process for deciding whether it is necessary to carry out an EIA and publish an ES is termed Screening, which establishes:

1. whether the project falls within Annex I or Annex II of the EIA Directive;
2. whether an Annex II project represents a ‘relevant project’;
3. the ‘determination’ for the purposes of Part V of The Roads (Northern Ireland) Order 1993 [as amended]; and
4. reporting the determination.

The first Screening decision is identifying whether the project falls within Annex I or Annex II to the EIA Directive. The EC Directive 85/337/EEC on “*the assessment of the effects of certain public and private projects on the environment*” came into effect in July 1988 and initiated a formal approach to environmental assessment throughout the EC. The Directive requires an environmental assessment to be carried out, prior to a development consent being granted, for certain types of major projects judged likely to have significant impacts on the environment.

In March 1997, EC Directive 85/337/EEC was amended by Directive 97/11/EC, which extends the list of projects which are considered to have significant effects on the environment, and provides selection criteria to determine whether non-mandatory projects require an environmental assessment. It also permits individual Member States to set their own criteria. A further important Article in the Directive is Article 5(3) which requires developers to provide an outline of alternatives which have been considered and an indication of the main reasons for the choice, taking into account environmental effects.

Annexes to Directive 97/11/EC identify classes of project where Article 4 determines whether assessment is either mandatory (Annex I) or discretionary (Annex II). Roads falling into Annex I are:

- Construction of motorways and express roads; and
- Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new roads, or realigned and/or widened section of road would be 10km or more in a continuous length.

Annex II includes all other road projects (excluding strictly maintenance projects) not listed in Annex I. Such projects require a determination process to be followed and EIA need is determined by significance of effect.

As the Proposed Scheme would require construction of motorway/express roads, it has been identified as an Annex I project. Therefore, as an EIA would be mandatory and an ES must be published, it is not subject to determination. This negates the need to undertake Steps 2, 3 and 4 of the Screening process. For the purposes of this Directive, 'express road' means a road which complies with the definition in the European Agreement on Main International Traffic Arteries of 15 November 1975.

1.3.2 *The purpose of the Environmental Statement*

With reference to DMRB Volume 11 Environmental Assessment, Section 2, Part 6 (HD 48/08), Chapter 3 (The Environmental Statement), the ES informs the final decision on whether the Proposed Scheme should be allowed to proceed. Its function is to give stakeholders, including the public and statutory environmental bodies an opportunity to express an opinion before the scheme is initiated, in accordance with Part V of The Roads (Northern Ireland) Order 1993 [as amended].

The ES identifies, describes and assesses in an appropriate manner, in light of each individual case and in accordance with Articles 4 to 11 of the EIA Directive and the EIA Regulations, the significant environmental effects of the Proposed Scheme on the factors mentioned in Article 3 of the EIA Directive. It contains the information referred to in the EIA Regulations and Annex IV of the EIA Directive to the extent that it is relevant to the specific characteristics of the project and of the environmental features likely to be affected by it and that (having regard in particular to current knowledge and methods of assessment) the information may reasonably be gathered.

New and improved roads are created by statute under the various provisions in The Roads (Northern Ireland) Order 1993 [as amended]. Before construction of a strategic road improvement can proceed, Transport NI must:

- make a Designation Order, identifying that part of the proposed road improvement which will become part of the Province's Special Road and Trunk Road network;
- make a Vesting Order, to compulsorily acquire the land required to construct the proposed road improvement;
- prepare an ES which predicts the environmental effects the proposed road improvement will have, and details the measures proposed to reduce or eliminate those effects.

1.3.3 *Matters for Inclusion in the Environmental Statement*

The ES comprises two parts, of different levels of detail:

- the Statement - a comprehensive and concise document drawing together all the relevant information about the project; and
- a Non-Technical Summary (NTS) – a brief report summarising the principal sections of the Statement in non-technical language.

The Statement details the likely impacts of construction and operation of the Proposed Scheme, as appropriate under each technical chapter assessed. Similar to other reports generated by earlier studies, construction impact is the consideration of any potential environmental impact (the majority of which are transient or short-term) before opening, and

once opened, operational impact considers the long-term usage impacts of the Proposed Scheme upon the surrounding environment.

The objectives of the environmental assessment are to provide the following:

- a) a description of the project (in accordance with Part V of The Roads (Northern Ireland) Order 1993 [as amended]);
- b) a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse environmental effects;
- c) the data required to identify and assess the main effects which the project is likely to have on the environment;
- d) an outline of the main alternatives studied by URS and endorsed by Transport NI, and an indication of the main reasons for the choice of project, taking into account the environmental effects; and
- e) a NTS of the information mentioned in (a) to (d) above.

1.3.4 Structure of the Environmental Statement

This ES comprises three volumes in accordance with DMRB 11.2.6; these are:

- Volume 1 Environmental Assessment – the main text of the document which includes separate Introduction (Part I), Environmental Assessment (Part II), Conclusions (Part III) and References and Glossary (Part IV). Document figures are integrated as necessary within each chapter of this volume;
- Volume 2 Appendices – all supplementary information associated with the document; and
- Non-Technical Summary (NTS) – outlining the findings of Volume 1 in non-technical language for ease of understanding by members of the public.

The structure of the ES is described below and depicted in Plate 1.1.

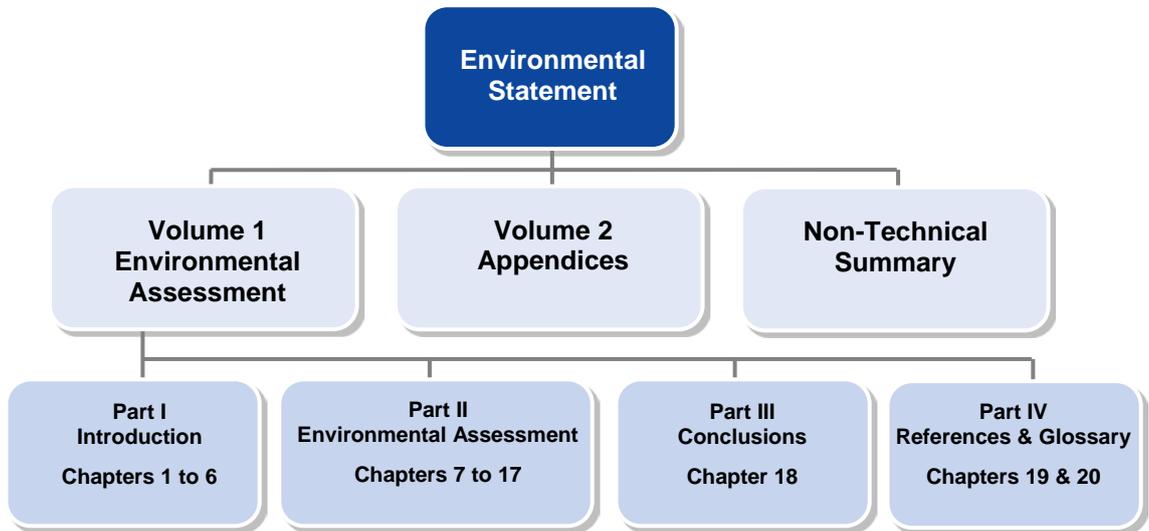


Plate 1.1: ES Structure Organogram

1.3.4.1 Volume 1 (Environmental Assessment)

This Volume is presented in four parts and 22 chapters.

Part I – Introduction (Chapters 1 to 6) encompasses the overall introduction to the scheme, which is as follows:

- Chapter 1: Introduction;
- Chapter 2: Strategic Need for the Proposed Scheme;
- Chapter 3: Alternatives Considered (a description of the alternatives which were considered before the Preferred Option arrangement was chosen);
- Chapter 4: Scheme Description;
- Chapter 5: Existing Conditions (a description of the study area in which the Proposed Scheme would be located); and
- Chapter 6: Consultations (details of the level of consultation taken place to date in relation to the scheme and with whom).

Part II - Environmental Assessment (Chapters 7 to 17) includes an overview of the DMRB assessment methodology:

- Chapter 7: Environmental Impact Assessment Methods is a description of how the assessment approach has been undertaken as recommended in DMRB Volume 11, Section 2, Part 6, paragraph 3.15 (Environmental Impact Assessment Methods) and the existing methodologies in DMRB Volume 11, Section 3 (Environmental Assessment Techniques) and Volume 11, Section 2 (General Principles of Environmental Assessment);

- Chapter 8: Air Quality assessment, which includes a DMRB ‘Detailed’ local air quality assessment and a ‘Simple’ regional level assessment of changes in air quality associated with the Proposed Scheme;
- Chapter 9: Cultural Heritage assessment, which includes a DMRB ‘Detailed’ level assessment to determine the impact of the Proposed Scheme on known and yet unknown cultural heritage assets in the area;
- Chapter 10: Ecology and Nature Conservation assessment, which addresses the impacts of the Proposed Scheme on habitats and protected flora & fauna (birds, otters, bats and badgers);
- Chapter 11: Landscape and Visual Effects assessment, which describes the potential impacts on the landscape resource and visual amenity associated with the Proposed Scheme;
- Chapter 12: Land Use assessment, which describes the potential impacts on land resources associated with the Proposed Scheme;
- Chapter 13: Noise and Vibration assessment, which describes how the Proposed Scheme would influence the noise environment in the study area;
- Chapter 14: Pedestrians, Cyclists, Equestrians and Community Effects assessment describes how the Proposed Scheme would impact the local community, Non-Motorised Users (NMUs) and others;
- Chapter 15: Vehicle Travellers assessment describes how the Proposed Scheme would impact the motorised road user in relation to driver stress and views from the road;
- Chapter 16: Road Drainage and the Water Environment assessment describes the impacts of the Proposed Scheme in relation to the existing water environment; and
- Chapter 17: Geology and Soils assessment describes how the Proposed Scheme would impact on the geological resources in the study area.

Part III – Conclusions (Chapter 18)

- Chapter 18: Details the cumulative effects associated with the Proposed Scheme on the surrounding area from a single project perspective (i.e. Interaction of Impacts); and cumulative impacts from different projects (in combination with the Proposed Scheme being assessed). A Summary of the Environmental Effects is also given, which provides a brief summary of the overall environmental effects described throughout each of the technical chapters (8-17), taking into account the effectiveness of measures (where appropriate) to mitigate adverse impacts, thus allowing for the overall significance of effect to be rated. At the end of the chapter, a Schedule of Environmental Commitments is given, which provides a collective summary of the proposed mitigation to ensure compliance during and beyond the construction contract period.

Part IV - References and Glossary of Terms (Chapters 19 & 20):

- Chapter 19: References used in the ES; and
- Chapter 20: Glossary of terms used in the ES.

1.3.4.2 **Volume 2 (Appendices)**

The appendices include information that is not essential to explaining the findings of the EIA, but support the analysis and validates conclusions. The appendices are numbered in accordance with the chapter to which they relate.

1.3.4.3 **Non-Technical Summary**

The NTS is provided at the beginning of the ES, and presents a concise overview of the contents of the ES and the key environmental issues associated with the Proposed Scheme. The NTS is also available as a separate report.

1.3.5 **The Assessment Team**

The EIA of the Proposed Scheme was undertaken, managed and compiled by URS, as part of a Transport NI commission for assessment, preparation and reporting of the York Street Interchange scheme.

Reviews and audits of assessments have been undertaken at key stages to ensure a robust EIA that complies with requirements of Part V of The Roads (Northern Ireland) Order 1993 [as amended]. Furthermore, consultation has taken place with key statutory and non-statutory stakeholders to establish any relevant constraints or factors which should be taken into account regarding the scheme, as described in further detail in Chapter 6 (Consultations).

1.3.6 **Review and Comment**

An exhibition of the Proposed Scheme ('The Orders Exhibition') will be held in the Ramada Encore Hotel, Talbot Street, Belfast on:

- 9th February 2015 (14:00 – 21:00); and
- 10th February 2015 (10:00 – 21:00).

Representatives of Transport NI and the project team will be available to explain the proposals and answer questions. Copies of the Environmental Statement may also be inspected during the exhibition and free of charge during office hours at the following deposit locations from 27th January to 10th March 2015:

- Transport NI – Headquarters, Room 2-13, Clarence Court, 10-18 Adelaide Street, Belfast BT2 8GB;
- Transport NI – Eastern Division Headquarters, Hydebank, 4 Hospital Road, Belfast BT8 8JL;
- Transport NI – Eastern Division Section Office, 148-158 Corporation Street, Belfast BT1 3DH;
- Belfast City Council, The Cecil Ward Building, 4-10 Linenhall Street, Belfast BT2 8BP; and
- Belfast Central Library, Royal Avenue, Belfast, BT1 1EA.

The Environmental Statement can also be viewed on the Transport NI website at www.drdni.gov.uk/yorkstreet. A bound paper copy of the Environmental Statement may be purchased at a cost of £185; and is also available on CD free of charge, by writing to the Strategic Roads Improvement Team, Transport NI – Eastern Division Headquarters,

Hydebank, 4 Hospital Road, Belfast BT8 8JL. The Non-Technical Summary is available free of charge from the same address.

If you wish to support, comment on, or object to the draft Orders, you should write to:

The Divisional Manager
Transport NI – Eastern Division Headquarters
Hydebank
4 Hospital Road
Belfast
BT8 8JL

Or email Roads.sriteastern@drdni.gov.uk by no later than 10th March 2015.

Information provided in response, including personal information, could be published or disclosed under the Freedom of Information Act 2000. For further information on confidentiality and this Act, please refer to www.ico.gov.uk

Depending on the nature and number of objections received, a Public Inquiry may be convened before an independent inspector. If an inquiry is to be held, all those who have responded will be notified of the date and the venue at least six weeks beforehand. Notices will also be placed in the local press.

All comments received will be made available to the inspector, who may decide to make them public.

1.4 Assessment of Implications on European Sites

Further to the mandatory requirement to undertake an EIA and publication of an ES for the York Street Interchange scheme, an Assessment of Implications on European Sites (AIES) (otherwise known as Habitats Regulations Assessment (HRA)) is also required. The AIES is a distinct and separate assessment required by law to inform the decision making process when the Proposed Scheme may have a significant effect on a Natura 2000 site.

Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and its amendments have been implemented in Northern Ireland by The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 [as amended]. The Directive requires Member States to protect over 200 habitats listed in Annex I to the Directive and approximately 1000 species listed in Annex II (not including birds), by means of a network of sites. Once adopted, these sites are designated by Member States as Special Areas of Conservation (SACs). Special Protection Areas (SPAs) are designated under Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended) (the Birds Directive). SPAs form a network of protected areas, together with SACs, known as Natura 2000 sites. The species listed in Annex I to the Directive are the subject of special conservation measures to ensure their survival and reproduction in their area of distribution. Each Natura 2000 site is subject to full legal protection under at least one of the Directives.

Development on or adjacent to Natura 2000 sites is strictly regulated. The Habitats Directive stipulates that where a policy, project or plan, either in isolation or combination with others, is likely to have a significant effect upon a designated SPA or SAC, an 'Appropriate Assessment' must be made under Article 6(3) of the Habitats Directive. The AIES/HRA applies to designated sites and candidate/proposed sites.

The AIES/HRA takes the form of four sequential stages. Firstly, Stage 1 Screening assesses if a significant effect will impact the site. If significant effects cannot be ruled out, then the

process proceeds to Stage 2 Appropriate Assessment. At this stage, an assessment of all the potential effects and their impacts on the interest features of the site is made. If there is deemed to be a significant negative impact, then Stage 3 Consideration of Alternatives, examines the possibilities of alternative solutions or choices for the Proposed Scheme. Finally, if Stage 4 (Consideration of Imperative Reasons of Overriding Public Interest) is considered necessary, the overriding health and safety concerns or public interest are examined, prior to requesting permission from the EU for the Proposed Scheme. The EU may still choose to reject it at this stage.

An HRA is required even if the plan or project is outside the boundary of a Natura 2000 site, if it might have an effect on an SPA or SAC. The assessment is concerned only with the ecological features and the processes which support them, for which the site has been designated. The assessment needs to determine whether the Proposed Scheme will have a significant adverse effect on the integrity of the features for which the site has been designated. Integrity is defined as: *'the coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the levels of populations of the species for which it was classified'*. (Source: DMRB Volume 11, Section 4, Part 1, Chapter 3 HD 44/09 – Assessment of Implications (of Highways and/or Roads Projects) on European Sites (including Appropriate Assessment)).

The assessment must be conducted by the 'competent authority' (i.e. the organisation that gives permission for the scheme to proceed, in this instance Transport NI). If the competent authority concludes that there are no significant adverse effects on integrity, then the Proposed Scheme can proceed. The competent authority may conclude that there might be adverse effects, unless certain methods/procedures are used – in which case it may apply conditions or similar to ensure that these methods/procedures are implemented.

If it concludes that there are adverse significant effects on the site integrity, then it must refuse the scheme until further investigation is undertaken. Imperative Reasons of Overriding Public Interest (IROPI) can enable a competent authority to agree to a scheme, even with likely significant adverse effects. Reasons include:

- Where the scheme is required to remove a serious risk to human health and public safety;
- For reasons of national security and defence, such as safeguarding human life or property; or
- If the scheme can demonstrate a clear public or direct environmental benefit on a national or international scale.

In these circumstances, compensation habitat must be provided for that lost. If the Competent Authority is minded to allow the project to proceed at this stage, the European Commission will need to be informed about the committed compensation measures via written submission issued through Northern Ireland Ministers under the advisement of the DRD. In other, more limited circumstances, it is possible to consent an application for economic reasons but not where the SPA/SAC includes priority habitats or species.

Therefore, road scheme proposals occurring close to Natura 2000 sites should be subject to AIES/HRA Screening at the very least, if they could potentially cause adverse impacts upon the key interest features of the sites, either in isolation, or in combination with other projects.

Within the immediate study area there are no European designated sites, however two are located within the wider area, which are designated under the Birds Directive. As such, an AIES/HRA has been completed to ascertain if there would be a detrimental effect to these sites and summarised within Chapter 10 (Ecology and Nature Conservation).

2. STRATEGIC NEED FOR THE PROPOSED SCHEME

2.1 Strategic Road Improvements

Strategic Road Improvements (SRIs) are major projects where the scheme cost is estimated to exceed £1.0M. The Regional Transportation Strategy (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 transport network, where lack of capacity is causing serious congestion, and to improve the environment by providing bypasses to towns situated on the Regional Strategic Transport Network (RSTN), relieving the effects of heavy through traffic.

Transport NI manages the delivery of SRIs under three programmes:

- **Construction Programme** Contains a list of major road improvement schemes currently under construction.

- **Preparation Pool** Allows high priority schemes to be advanced through the statutory processes up to the point where a decision to commit to invest in building the solution can be made. Subsequent progression into the Construction Programme is dependent on the level of funding available at that time.

- **Forward Planning Schedule** A list of major road improvement schemes identified for preliminary development, which together with those in the Preparation Pool and Construction Programme, constitute the SRI Programme. The highest priority schemes will be considered for progression into the Preparation Pool.

2.2 How does Transport NI decide if an SRI scheme should be built?

Transport NI carries out a comprehensive appraisal of each SRI proposal. The appraisal procedure requires a clear understanding of the objectives which are to be met, and appropriate criteria to be used, to decide whether a proposal meets them. The objectives for the Proposed Scheme at a high-level reflect the Government's five main objectives for transport outlined in its 1998 White Paper entitled '*A New Deal for Transport: Better for Everyone*' and detailed in the Regional Strategic Transport Network Transport Plan (RSTNTP) 2015 and are pivotal to the appraisal process.

- **Environmental** impact involves reducing the direct and indirect impacts of transport facilities on the environment of both users and non-users. There are ten sub-objectives including noise, atmospheric pollution of differing kinds, impacts on countryside, wildlife, ancient monuments and historic buildings;

- **Safety** is concerned with reducing the loss of life, injuries and damage to property resulting from transport incidents and crime. The two sub-objectives are to reduce accidents and improve security;

- **Economy** is concerned with improving the economic efficiency of transport. The five sub-objectives are to improve economic efficiency for consumers and for business users and providers of transport, to improve reliability and the wider economic impacts, and to get good value for money in relation to impacts on public accounts;
- **Accessibility** is concerned with the ability with which people can reach different locations and facilities by different modes; and
- **Integration** aims to ensure that all decisions are taken in the context of the Government's integrated transport policy.

There is tension between these objectives, such that proposals may contribute to the achievement of one objective, but work against the achievement of others. The appraisal procedure must allow determination of an appropriate balance between the five objectives.

2.3 Strategic need for York Street Interchange

The city of Belfast is Northern Ireland's major transport hub and the main transport gateway to the rest of the United Kingdom and Europe. The Belfast Metropolitan Area (BMA) is typical of most large urban areas, comprising a set of radial road links that converge on a central hub, represented by the City Centre. The BMA occupies a strategic position on several Key Transport Corridors (KTCs) that collectively form part of the strategic road network managed by Transport NI; these include the:

- Eastern Seaboard KTC;
- North-Western KTC;
- Northern KTC; and
- South-Western KTC.

The strategic road network, along with the rail network, forms Northern Ireland's overall RSTN.

The KTCs within Northern Ireland provide connection to other major European cities through the Region's gateways. These gateways include Northern Ireland's airports and sea ports. The Eastern Seaboard KTC runs through Belfast and provides connections to the regional gateways of the Port of Belfast and George Best Belfast City Airport. Within the BMA it comprises the M1, Westlink and M2. The importance of the Eastern Seaboard KTC and its component roads is recognised by the European Commission in its designation of the corridor as part of the Priority 9, 13 and 26 axes within the Trans-European Transport Network.

The existing York Street junction is a node on the Eastern Seaboard KTC, located to the north of Belfast City Centre. At this node, strategic traffic movements along this corridor interact with strategic traffic movements to and from the M3 and local traffic movements into and out of Belfast City Centre. The conflict between strategic and local traffic movements is presently controlled by a complex arrangement of traffic signals that includes four signalised junctions at York Street, York Link, Nelson Street and Great George's Street. The overall signalised "box" created by these four signalised junctions is known as the York Street junction.

The capacity of the existing York Street junction is limited by both the magnitude of competing traffic flows and the various physical constraints at the location. These physical constraints include adjacent residential housing, commercial, retail and industrial properties, elevated rail infrastructure carried on the Dargan Bridge and the capacity of existing roads infrastructure including the Westlink, the M2 and the elevated M3 carried on the Lagan Bridge.

The lack of capacity at the junction causes undue congestion and thereby delays for freight, public transport and private vehicles. It is therefore considered a bottleneck on the strategic road network, in accordance with the definition established by Northern Ireland's Regional Transportation Strategy.

Improvements to the strategic road network have been established in Northern Ireland policy through the publication of the Regional Development Strategy (RDS) and the RTS. These strategies are implemented in local policy through the RSTNTP, the Belfast Metropolitan Transport Plan (BMTP) and the Investment Strategy for Northern Ireland (ISNI). These regional strategies, together with the local policy publications, were based on the Guidance on the Methodology for Multi-Modal Studies, an objective-led approach to seeking solutions to transport-related problems and were prepared in consultation with and informed by stakeholders.

2.3.1 ***Scheme-Specific Objectives***

The following scheme-specific objectives have been identified:

- to remove a bottleneck on the strategic road network;
- to deliver an affordable solution to reduce congestion on the strategic road network;
- to improve reliability of strategic journey times for the travelling public;
- to improve access to the regional gateways from the Eastern Seaboard Key Transport Corridor;
- to maintain access to existing properties, community facilities and commercial interests;
- to maintain access for pedestrians and cyclists; and
- to improve separation between strategic and local traffic.

These high-level and specific objectives have been used in the development of the Proposed Scheme ahead of assessment.

2.4 **Strategic Context**

2.4.1 ***European Union Policy***

European Union (EU) policy for transportation was first established in 1993, with the creation of the trans-European networks (TENs) in transport (TEN-T), energy and telecommunications based on Title XVI, Articles 170-172 of the Treaty on the Functioning of the European Union. The TENs allow the internal market to function, link European regions with each other, and connect Europe with other parts of the world. The main EU-wide instruments of the TENs policy are:

- Union Guidelines, which set out objectives, priorities and outlines of measures for establishing and developing networks, to create the framework for identifying projects of common interest; and
- an EU infrastructure fund to support projects of common interest. These projects are prepared and implemented following the subsidiarity principle and in compliance with the relevant rules and procedures of the Member States on whose territories the projects are located.

In the transport sector, the first guidelines were adopted by the European Parliament and the Council in 1996; the first regulation for EU funding was adopted in 1995. TEN-T policy has a rising importance today, against a background of three major enlargements and evolving economic and political situations during its 20 years of existence. A substantial policy review was launched in 2009 and led to a new legislative framework that came into force in January 2014. The current provisions setting out the framework for policy development in transport up to 2030/2050 are therefore:

- Regulation (EU) No **1315/2013** of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU; and
- Commission Delegated Regulation (EU) No 473/2014 of 17 January 2014 amending Regulation (EU) No 1315/2013 of the European Parliament and of the Council as regards supplementing Annex III thereto with new indicative maps.

The TEN-T is a network which comprises roads, railway lines, inland waterways, inland and maritime ports, airports and rail-road terminals throughout the 28 Member States. This is a key factor for the network's efficient, safe and secure operation, using seamless transport chains for passengers and freight. It builds on existing and planned infrastructure in these States which has been identified on the basis of a single methodology and which has to comply with common requirements/standards (set out in the TEN-T Guidelines). The TEN-T consists of two planning layers:

5. The **comprehensive network**: a multi-modal network of relatively high density which provides all European regions (including peripheral and outermost regions) with accessibility that supports their further economic, social and territorial development as well as the mobility of their citizens. Its planning has been based on a number of common criteria (e.g. volume thresholds for terminals or accessibility needs). The total length of the comprehensive network amounts to:
 - 138,072km of railway lines;
 - 136,706km of roads; and
 - 23,506km of inland waterways.
6. The **core network**: a part of the comprehensive network, distinguished by its strategic importance for major European and global transport flows. It results from a single European planning methodology (SWD(2013) 542 final) developed by the European Commission and subjected to broad consultation among Member States and other stakeholders. The total length of the core network amounts to:
 - 68,915km of railway lines;
 - 59,630km of roads; and
 - 23,506km of inland waterways.

The Connecting Europe Facility (CEF) governs EU funding in transport, energy and telecommunications sectors during the period 2014-2020 and was implemented by Regulation (EU) No. 1316/2013 of the European Parliament and of the Council of 11 December 2013. For the purposes of facilitating a co-ordinated implementation of the core network, the concept of “core network corridors” was introduced in Annex I to the CEF Regulation to focus EU support from the CEF to:

- remove bottlenecks;
- build missing cross-border connections; and
- promote modal integration and interoperability.

Nine core network corridors have been identified by the CEF Regulation which include a list of projects pre-identified for potential EU funding, with a work plan existing for each corridor that establishes the current status of its infrastructure and a schedule for the removal of physical, technical and operational bottlenecks.

Of these nine corridors, the North Sea-Mediterranean Corridor runs from Cork, through Dublin and into Northern Ireland to Larne, before crossing the Irish Sea to run from Scotland through England and Wales and connect to continental Europe, where it continues through the Netherlands, Belgium and Luxembourg to the Mediterranean Sea in the south of France. This is shown in Figure 2.1

This multi-modal corridor encompasses a number of Priority Projects which have been identified by the CEF Regulation that will upgrade and improve connections from the British Isles to continental Europe. Of this list of projects, Priority Project 26 seeks to upgrade port and multi-modal connections in Belfast, with the proposed York Street Interchange scheme included on the developed list of active projects (reference 2011-UK-93016-S). The identified purpose of the scheme is to improve access to and from the Port of Belfast, and to remove a major bottleneck (i.e. the existing York Street junction).

2.4.2 United Kingdom Policy

2.4.2.1 A New Deal for Transport: Better for Everyone

The Government's White Paper entitled '*A New Deal for Transport: Better for Everyone*' (1998) sets out a new approach to transport policy that has relevance throughout the entire UK. It embodied new, modern thinking on integrating transport with other aspects of Government policy.

It recognised that different parts of the UK have differing transport needs and that the devolved regions would consider their own transport priorities and separate documents would be published for Scotland, Wales and Northern Ireland.

It also noted that a New Approach To Appraisal (NATA) was being developed for the appraisal of differing transport problems. NATA was designed to draw together the large amount of information collected as part of the appraisal of a transport problem and alternative solutions. This information is set against five criteria adopted for the review of trunk roads, as noted in Sub-Section 2.2 (i.e. Environmental Impact, Safety, Economy, Accessibility and Integration).

In response to this White Paper, the "Moving Forward: The Northern Ireland Transport Policy Statement" published in 1998 outlined a strategy for implementing the Government's objectives in the special context of Northern Ireland. This informed the Regional Strategies for Northern Ireland set out below.

2.4.3 Northern Ireland Policy

2.4.3.1 Moving Forward: The Northern Ireland Transport Policy Statement

This policy statement outlined a strategy for implementing the objectives of the White Paper in a way that reflected the particular circumstances of Northern Ireland.

It noted that transport in Northern Ireland was predominately based on cars, buses and lorries using the road system, and that this approach would continue to provide for transport needs for many years but greater emphasis would be given to the needs of the pedestrian, cyclist and public transport – both bus and rail. It also noted that *“it is clear that simply continuing to expand the road network to meet ever increasing demands from the private car would not meet the Region’s social and economic requirements or secure mobility that is sustainable in the long term”*.

In summary, the main elements of the approach included recognition that:

- cars will remain a significant feature of passenger transport in Northern Ireland for the foreseeable future;
- the road network will continue to carry the vast bulk of freight within Northern Ireland and to customers beyond; and
- substantial further investment will be needed in the strategic road network in the first quarter of the 21st Century in the interests of economic growth, for environmental and quality of life reasons and to improve safety.

The Policy Statement proposed a series of specific measures to help develop a more integrated, balanced and effective transport system for the whole of Northern Ireland which would offer people a balanced variety of transport options and recognise the transport needs of business. Such a system would be designed to limit transport-generated air pollution and transport’s contribution to the threat of climate change, protect the amenity of residential areas and contribute to the development of a more inclusive society. In summary, these measures would include:

- the development of a more strategic approach to Northern Ireland’s transportation needs through the preparation of a Regional Transport Plan, with the first ‘formal’ plan in place for the financial year 2001-02. This plan would determine and co-ordinate all transport activities including transport infrastructure development and traffic management initiatives to be taken forward over the next five years;
- better integration of the transport system and development of the region’s land uses within the context of the Regional Strategic Framework, published by the Department; and
- better integration of transport policy with other Government policies designed to create a fairer, more inclusive, healthier and prosperous society.

The Policy Statement contained other important recommendations relating to partnerships, education and awareness. The measures would be put into effect through the Regional Transport Plan process, which would contain a number of implementation programmes and targets for specific measures in particular areas.

2.4.4 Regional Strategies

2.4.4.1 The Regional Development Strategy (RDS) 2035 – Building a Better Future

The RDS (2035) provides an overarching strategic planning framework to facilitate and guide the public and private sectors. It does not redefine the other Government Departments’ strategies but complements them with a spatial perspective. It revises the original RDS 2025 strategy published in 2001 and amended in 2008, and whilst many of the objectives of the previous strategy are still valid, this document now replaces it.

The RDS influences various government strategies, including:

- the Programme for Government (PfG); and
- the Investment Strategy for Northern Ireland (ISNI).

The Strategy takes account of key driving forces such as population growth and movement, demographic change, the increasing number of households, transportation needs, climate change and the spatial implications of divisions that still exist in our society. It is a framework which provides the strategic context for where development should happen, however it does not contain operational planning policy which is issued through Planning Policy Statements (PPSs) published by the Department of the Environment (DOE).

The RDS has a statutory basis under the Strategic Planning (Northern Ireland) Order 1999, which requires Government Departments to “*have regard to the Regional Development Strategy*” in exercising any functions in relation to development.

2.4.4.1.1 **Key Elements**

The Strategy has four key elements:

- a Spatial Framework which divides the region into 5 components based on functions and geography;
- Guidance at two levels:
 - Regional level that is to be applied to all parts of the region; and
 - Specific guidance for each element of the Spatial Framework.
- a Regionally Significant Economic Infrastructure section which identifies the need to consider strategic infrastructure projects; and
- Implementation which sets out how the strategy will be implemented.

2.4.4.1.2 **Aims**

The eight aims of the revised RDS are to:

1. Support strong, sustainable growth for the benefit of all parts of Northern Ireland;
2. Strengthen Belfast as the regional economic driver and Londonderry as the principal city of the North West;
3. Support our towns, villages and rural communities to maximise their potential;
4. Promote development which improves the health and wellbeing of communities;
5. Improve connectivity to enhance the movement of people, goods, energy and information between places;
6. Protect and enhance the environment for its own sake;
7. Take actions to reduce our carbon footprint and facilitate adaption to climate change; and
8. Strengthen links between north and south, east and west, with Europe and the rest of the world.

2.4.4.1.3 **The Spatial Framework**

Implementation of the vision and aims of the RDS requires a Spatial Framework to enable strategic choices to be made in relation to development and infrastructure investment. The key issues which influenced the Spatial Framework within the RDS are the:

- importance of Belfast City, at the heart of a Metropolitan area, as the major driver for regional economic growth; its population has declined but it remains the regional focus for administration, commerce, specialised services and cultural amenities;
- significant role which Londonderry has to play as the principal city of an expanding North West region; its recognition as the UK City of Culture 2013, will add impetus to the integrated approach to regeneration being taken forward in the 'One Plan' (One City One Plan One Voice: Regeneration Plan for Derry~Londonderry);
- importance of Main Hubs and Clusters well placed to benefit from and add value to regional economic growth; and that critical mass to attract growth can be created by the identification of clusters;
- need to build on the approach to urban renaissance of developing compact urban form by further integrating key land uses with transportation measures. The focus should be on the use of land within existing urban footprints, particularly within the hubs;
- new emphasis on how to reduce dependence on the car and change travel behaviour; and
- importance in all aspects of forward planning to address the consequences of climate change; this means an even greater focus on where people live and work and how transport and energy needs are planned.

Chapter 3 of the RDS sets out the strategic guidance specific to these areas, focusing on the key principles of the economy, society and the environment. The guidance is also split into Regional Guidance (RG) and Spatial Framework Guidance (SFG) some of which is specifically applicable to the Proposed Scheme, as described below.

2.4.4.1.4 **Regional Guidance**

2.4.4.1.4.1 **Economy**

RG2: *Deliver a balanced approach to transport infrastructure* – the focus of this guidance is on managing the use of the road and rail space and how it can be used in a better, smarter way. The New Approach to Regional Transportation develops this guidance further (as noted in Section 2.4.4.2.1). Accordingly, the Proposed Scheme should aim to:

- improve connectivity;
- maximise the potential of the RSTN;
- use road space more efficiently;
- improve social inclusion;
- manage the movement of freight;
- improve access to our cities and towns; and
- improve safety by adopting a 'safe systems' approach to road safety.

2.4.4.1.4.2 **Society**

RG7: *Support urban and rural renaissance* – in urban areas this guidance focuses on the process of development and redevelopment in urban areas to attract investment and activity, foster revitalisation and improve the mix of uses. Accordingly, the Proposed Scheme should aim to:

- reduce noise pollution.

2.4.4.1.4.3 **Environment**

RG9: *Reduce our carbon footprint and facilitate mitigation and adaptation to climate change whilst improving air quality* – this guidance focuses on reducing air pollution and greenhouse gas emissions and preparing for the impacts of climate change. These include the effects on species and habitats and on health as a result of warmer temperatures, storms, floods and coastal erosion. Accordingly, the Proposed Scheme should aim to:

- reduce greenhouse gas emissions from transport;
- reduce noise and air pollution from transport;
- protect Air Quality Management Areas; and
- minimise development in areas at risk from flooding from rivers, the sea and surface water run-off.

RG11: *Conserve, protect and, where possible, enhance our built heritage and our natural environment* - in accordance with this guidance, the Proposed Scheme should provide effective care for the built and natural environment, in terms of improving health and well-being, promoting economic development and addressing social problems which result from poor quality environment. In accordance with this guidance, this Proposed Scheme should aim to:

- identify, protect and conserve the built heritage, including archaeological sites and monuments and historic buildings;
- identify, protect and conserve the character and built heritage assets within cities;
- maintain the integrity of built heritage assets, including historic landscapes;
- sustain and enhance biodiversity;
- identify, establish, protect and manage ecological networks;
- protect and encourage green and blue infrastructure within urban areas;
- protect and manage important geological and geomorphological features; and
- recognise and promote the conservation of local identity and distinctive landscape character.

RG12: *Promote a more sustainable approach to the provision of water and sewerage services and flood risk management*. Accordingly, the Proposed Scheme should aim to:

- integrate water and land-use planning; and

- encourage sustainable surface water management.

2.4.4.1.5 **Special Framework Guidance**

The spatial framework has the following five components:

- The Metropolitan Area centred on Belfast;
- Londonderry - principal city of the North West;
- Hubs and Clusters of Hubs;
- The Rural Area; and
- Gateways and corridors.

2.4.4.1.5.1 **The Metropolitan Area centred on Belfast**

The Belfast Metropolitan Urban Area (BMUA) is at the centre of the regional transport network and the major gateway for national and international trade. The BMUA has a major role in the European network of City Regions with vital links to Dublin, mainland Britain and continental Europe. Belfast's airports and sea port serve the Region as gateway links to the world.

SFG1: Promote urban economic development at key locations throughout the BMUA and ensure sufficient land is available for jobs - significant investment will be required to sustain and grow the BMUA. Employment opportunities should be planned in a way that recognises the roles that the component parts play, builds on planned regeneration initiatives, and maximises the use of existing and planned infrastructure provision, including public transport.

SFG2: Grow the population of the City of Belfast - an efficient public transport system will provide the connections to jobs, services and amenities.

SFG4: Manage the movement of people and goods within the BMUA - recognises that transport has a key role to play in developing competitive cities and regions. An efficient transport infrastructure is not only important for a successful economy but it can also help promote social inclusion by providing an affordable alternative to the private car.

SFG5: Protect and enhance the quality of the setting of the BMUA and its environmental assets - the BMUA has a significant natural setting surrounded by hills. It is important to recognise the significance of the existing environmental assets and protected areas of high scenic value.

2.4.4.1.5.2 **Gateways and Corridors**

Gateways are strategically important transport interchanges which are important for economic development, freight distribution activities and additional employment generation. The quality of connection from the air and sea ports to the internal transport network is crucial for economic competitiveness and the convenience of the travelling public.

Belfast is the major Regional City Gateway, with the principal sea port of Northern Ireland and a city airport.

Economic Corridors have been identified based on the RSTN and have a fundamental role to play in regional growth. They can help strengthen economic competitiveness, increase the attractiveness of Belfast, provide access to the air and sea ports and are essential for providing access to the gateways.

SFG15: *Strengthen the Gateways for Regional Competitiveness* - Gateways should be able to deal with goods and passenger traffic efficiently and be considered as an asset by potential investors and local firms. Many of the gateways are intrinsically linked to important nature conservation sites or the aquatic environment, and their development must be appropriately managed to take account of this.

- Provide high quality connections to and from the air and sea ports.
- Enhance gateways and their environmental image.

2.4.4.1.6 **Regionally Significant Economic Infrastructure**

Chapter 4 of the RDS states that spatial planning and related infrastructure development is essential to enable a working economy. Being part of an island, air and sea ports and land gateways are of fundamental importance to the region. Gateways should be able to cope with the volume and variety of traffic passing through them. They should also aim to accommodate businesses that benefit from proximity to the point of entry/departure.

Gateways are where first impressions are formed and should provide a high quality experience for the traveller.

- Transport linkages to and from the air and sea ports should be of the highest quality;
- Improving key transport corridors enhances accessibility to regional services and reduces peripherality. This means high quality road and, where available, rail links; and
- The transportation networks help to deliver balanced economic growth.

The five KTCs link people and freight to Northern Ireland's main cities, air, and sea ports and provide a framework around which economic corridors can develop. The KTC comprises 3% of all Northern Ireland's roads, but carries 26% of the traffic. Investment in the Key Corridors and in the rail infrastructure is desirable to ensure the efficient movement of goods and people.

Specific programmes (i.e. York Street Interchange) will be dependent on the availability of resources and the strategic direction of the new RTS.

As one of Northern Ireland's economic drivers, an efficient transport system in Belfast is essential to allow people and goods to move quickly around the city and to commute to and from it. High quality public transport for Belfast is therefore also necessary for regional prosperity.

2.4.4.2 **The Regional Transportation Strategy 2002-2012**

The RDS published in 2001 described how the RTS is an integral part of it and set the vision for it *"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"*. This vision is still appropriate for the New Approach to Regional Transportation (discussed further below). The RTS has guided investment decisions up to 2015. Following this, the Strategic Document, *'Ensuring a Sustainable Transport Future - A New Approach to Regional Transportation'* will be used for decision making.

An integral feature of the RDS (2001) was the production of the Regional Transportation Strategy for Northern Ireland 2002 to 2012. This identified strategic transportation investment priorities and considered potential funding sources and affordability of planned initiatives over a ten-year period. The overall development of this strategy was based on the Guidance on

the Methodology for Multi-Modal Studies (GOMMMS), an objective-led approach to seeking solutions to transport-related problems. The Government's five key objectives of environment, safety, economy, accessibility and integration were adopted and were central to the development of the RTS. Following extensive consultation on transportation issues facing the region, an understanding was formed of the current constraints of the transportation system and requirements for future growth in line with the RDS. By comparing perceived problems to potential solutions, a comprehensive list of potential transportation initiatives was drawn up.

The RTS was then implemented through three Transport Plans:

- the RSTNTP;
- the BMTP; and
- the Sub-Regional Transport Plan.

These Transport Plans present detailed programmes of major schemes and transport initiatives that support the objectives of the RTS and contribute to the RTS targets, taking full account of relevant Development Plans (i.e. the Belfast Metropolitan Area Plan (BMAP) 2015).

Within the RTS, the importance of a strategy to remove bottlenecks is recognised. In particular, this focuses upon strategic road improvements to upgrade the KTCs and the other routes on the RSTN. The RTS also defines the bottlenecks as structural deficiencies where lack of capacity causes undue congestion and thereby delays for freight, public transport and cars.

The transportation initiatives from the RTS did not specifically refer to the York Street Interchange scheme. Instead, with regard to funding for the strategic road network, it was envisaged that (subject to full assessment and statutory procedures) the strategy would focus on inter-urban routes with the development of high-quality dual carriageways and the removal of structural deficiencies (bottlenecks) where lack of capacity causes undue congestion.

2.4.4.2.1 *Ensuring a Sustainable Transport Future – A New Approach to Regional Transportation*

The current Regional Transportation Strategy 2002-2012 was successful in securing high levels of public funding to improve transportation infrastructure. However, the speed and direction of change in society prompted the need for review. The increase in population and vehicles has placed significant pressures on transportation networks, coupled with fiscal constraints and the need to reduce environmental impacts.

A revised strategy document, '*Ensuring a Sustainable Transport Future – A new Approach to Regional Transportation*', was launched in March 2012. The new approach to regional transportation complements the RDS and aims to achieve its vision for transportation. One of the main Strategic Objectives of the Strategy is to '*improve connectivity within the region*' by completing the work identified in the current RSTNTP (as detailed below) and Strategic Road Improvement (SRI) Programme.

The New Approach essentially builds on what has been achieved. It emphasises the need to concentrate on moving people rather than vehicles, creating space on the networks for people and also for freight, and on maintaining what is in place and using it in a smarter way. It is different from the current strategy in that it is not constructed on schemes and projects. Rather, it sets the High Level Aims and Strategic Objectives for transportation in Northern Ireland that form the basis for future decision-making on DRD's transportation funding priorities.

The New Approach complements the revised RDS 2035 and does not include details of schemes or projects, instead sets a visionary target “*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*”. To achieve this, three high level aims for transportation along with twelve supporting Strategic Objectives, covering the economy, society and the environment have been set. The High Level Aims and Strategic Objectives are:

- A. Support the Growth of the Economy:
 - improve connectivity within the region;
 - use road space and railways more efficiently;
 - better maintained transport infrastructure;
 - improve access in our towns and cities;
 - improve access in rural areas; and
 - improve connections to key tourism sites.
- B. Enhance the quality of life for all:
 - improve Safety;
 - enhance Social Inclusion; and
 - develop transport programmes focused on the user.
- C. Reduce the Environmental Impact of Transport:
 - reduce Greenhouse gas emissions from transport;
 - protect biodiversity; and
 - reduce water, noise and air pollution.

The new approach starts with the assumption that the decision to travel has been made. It seeks to provide the infrastructure and services that will ensure that travel and transport are as sustainable as possible.

This Strategic Document considers a number of key trends in transportation, such as:

- the number of vehicles has increased and is over 1million;
- up to 2007, the volume of freight was increasing; and
- by 2031, the population in Northern Ireland is forecast to be over 2 million.

The York Street Interchange scheme clearly complements the Strategic Objectives of this Strategy, in particular, improving connectivity within the region, improved access in our towns and cities, and improved connections to key tourism sites.

2.4.5 *Transport Plans*

2.4.5.1 *Overview*

As noted above, a number of Transport Plans were developed to implement the RTS and will continue until 2015. Beyond this period, the Department will prepare a long list of possible strategic transport interventions. This will be a substantial exercise and work has already started looking at the existing plans to see what has yet to be delivered. The Department will undertake an initial sift, removing strategic transport interventions which would be obviously unaffordable and seek to combine others to develop Strategic Programmes of Interventions where possible.

The next stage would be to apply the Prioritisation Framework to the list of possible strategic transportation interventions and arrive at an Initial Prioritised List, which would then be subject to Transport Appraisal.

2.4.5.2 *The Regional Strategic Transport Network Transport Plan 2015*

The RSTNTP sets out how the RTS will be implemented and confirms the individual schemes and projects to be implemented (subject to economic assessments, statutory processes and availability of resources) to support the RDS (2025 version) and RTS objective and targets. The RSTN incorporates 5% of the road network, which carried around 37% of total road traffic movements, and all of the rail system. The RSTNTP aimed to develop a RSTN based on the five KTCs identified in the RDS.

The RSTN included the complete rail network and the strategic road network. The strategic road network is comprised of the combined network formed by the KTCs, Link Corridors and Trunk Roads, as shown on Figure 2.2.

The RSTNTP includes a programme for the implementation of SRIs to remove bottlenecks on the network where lack of capacity is causing serious congestion, and to improve the environment by providing bypasses of towns situated on the RSTN, thus relieving the effects of heavy through traffic. Although the York Street Interchange scheme was not specifically presented as one of these improvements, in line with Tran 1.2 of SPG-TRAN 1 from the RDS (*to develop a Regional Strategic Transport Network based on key transport corridors, to enhance accessibility to regional facilities and services*) to develop and maintain the identified RSTN to enhance accessibility on an integrated basis for all users including freight, the aims are to:

- incorporate quality public transport elements along the corridor routes with multi-modal interchange facilities, including provision for walking and cycling;
- target improvements to upgrade the network, road and rail, giving priority to the Key, Link and Metropolitan Transport Corridors; and
- upgrade Westlink as a priority to reduce impacts of congestion and facilitate through traffic and freight movement, particularly that associated with the ports of Belfast and Larne.

2.4.5.3 *The Belfast Metropolitan Transport Plan*

Prepared by DRD, the BMTP is a local non-statutory transport plan for the BMA, which takes forward the strategic initiatives of the RTS and sets out transport proposals for the BMA which people can expect to see implemented by 2015. The BMTP and BMAP are mutually supportive and integrated documents, with the former acting as a Technical Supplement to the latter in relation to transportation.

The overall development of the BMTP was based on GOMMMS, ensuring that a comprehensive range of solutions had been considered covering all modes of transport. It also ensured integration between transport and land use. Development of the BMTP was especially influenced by the guidance provided by the RDS and RTS, and enabling the generic multi-modal study process to be focused on the particular needs and special context of the BMA. An extensive consultation exercise was also undertaken, ensuring that the views of a wide range of stakeholders were taken into account in the development of the Plan. The consultation process built upon the extensive consultation exercise undertaken to support the RDS and RTS.

The BMTP identified a road hierarchy within the BMA, comprising the Strategic Highway Network linked to the wider RSTN in the RSTNTP and a Non-Strategic Highway Network. The Strategic Highway Network identified by the BMTP includes the Westlink, M2 and M3, and a series of improvements are identified on the M1/Westlink and M2 routes to remove identified bottlenecks. With regards to the planned improvements to the M1/Westlink, the BMTP cautioned that:

“the improvements to the M1/Westlink will require further consideration to be given to improving the capacity and operation of the signalised junctions at York Street/Westlink and Nelson Street/York Link/Great George’s Street.”

2.4.6 Development Plan

2.4.6.1 A Strategic Planning Policy Statement for Northern Ireland (SPPS) Planning for Sustainable Development (Draft)

The draft Northern Ireland SPPS was published in February 2014 and subject to a three month consultation period. The draft SPPS consolidates 20 separate policy publications into one document, setting out the core planning principles to underpin delivery of a reformed two-tier planning system from April 2015. The final SPPS will come into effect on the 31st March 2015 with the transfer of planning to councils and will be an essential, key element of the broader planning and local government reform programme setting the direction for new councils to bring forward detailed operational policies within future local development plans. The draft policy has not been reviewed in this Environmental Statement, as its adopted status is not confirmed at the time of writing.

2.4.6.2 Belfast Metropolitan Area Plan 2015

The DOE, under the provisions of Part III of the Planning (Northern Ireland) Order 1991, has adopted the Belfast Metropolitan Area Plan (BMAP) to the extent approved and endorsed in The Belfast Metropolitan Area Plan Adoption Statement 2014.

The Plan, as adopted, became operative on 09 September 2014 covering the City Council areas of Belfast and Lisburn, and the Borough Council areas of Carrickfergus, Castlereagh, Newtownabbey and North Down, and comprises seven volumes:

- Volume One consists of Parts One, Two, and Three which deal with the Plan Area as a whole; and
- Volumes Two to Seven comprise Part Four (the District Proposals) which set out the site-specific proposals for individual Council areas.

The purpose of the Plan is to inform the general public, statutory authorities, developers and other interested bodies, of the policy framework and land use proposals that are used to guide development decisions within the BMA over the Plan period.

The Plan is prepared within the context of the priorities of the Northern Ireland Executive as set out in the Programme for Government, taking into account European, National and Regional policies which have implications for the future pattern of development within the BMA. The Plan establishes policy guidelines within which more detailed development proposals can be determined. It assists public agencies (i.e. Transport NI) in decisions concerning infrastructure improvements and also assists private developers in reaching their land use based decisions over the Plan period.

As noted earlier, the RDS sets out a dynamic strategic spatial planning framework for Northern Ireland to guide physical development within the region until 2035 and provides an overarching strategic framework for development plans. The aim of BMAP is to provide a planning framework which is in general conformity with the RDS in facilitating sustainable growth and a high quality of development in the BMA throughout the Plan Period, whilst protecting and where appropriate, enhancing the natural and man-made environment of the plan area.

The RDS recognises the important role Belfast plays in generating regional prosperity. It seeks to maximise the use of existing infrastructure and services. The Strategy also recognises that policies for physical development have far-reaching implications. It therefore addresses economic, social and environmental issues aimed at achieving sustainable development and social cohesion.

It highlights the need to build on the approach to urban renaissance of developing compact urban form by further integrating key land uses with transportation measures. The focus should be on the use of land within existing urban footprints.

DRD has determined, in accordance with Article 28(7) of the Planning (Amendment) (Northern Ireland) Order 2003, that BMAP is in general conformity with the RDS 2035. As such, the Plan has a significant role to play in achieving the vision of the RDS through the Plan Strategy and Plan Proposals.

2.4.6.2.1 *Belfast Metropolitan Area Plan 2015 – District Proposals Belfast*

The Belfast City Strategy has been determined to reflect the strategic vision and framework which flows from it. The strategy is made up of the following planning actions:

- Promoting Urban Renewal in the City through:
 - accommodating the majority of housing growth within the urban footprint;
 - designating the majority of employment opportunities in locations which will help secure regeneration and revitalisation;
 - a wide range of designations, policies and zonings which will help revitalise the City Centre; and
 - designations and policies which will promote revitalisation of Arterial Routes in the City.
- Enhancing the Quality of Life in the City through:
 - providing an urban design framework for the City Centre;
 - protecting the built heritage through the designation of 51 Areas of Townscape Character;

- metropolitan Development Limit designation which prevents suburban sprawl and protects the unique and striking setting of the City;
- protecting existing parks, green areas, the coastline and designating 68 Local Landscape Policy Areas, 34 Sites of Local Nature Conservation Importance, nine Community Greenways, and four Urban Landscape Wedges;
- protecting six sites for proposed health facilities and two sites for proposed education facilities; and
- providing greater certainty about the locations where various forms of development are likely to take place over the Plan period.
- A Focus For Economic Development in the City through:
 - City Centre designations, policies and zonings including five Development Opportunity Sites;
 - close linkage between employment opportunities and regeneration needs;
 - the designation/zoning of employment sites and mixed-use sites in the City, along with a substantial employment potential identified at Titanic Quarter; and
 - confirming existing employment land in various locations.
- Promoting Equality of Opportunity for All Sections of the City Population through:
 - providing a wide range of opportunities for house building and job creation throughout the City;
 - designating/zoning employment sites in North, West and East Belfast in line with government’s Anti-Poverty and Social Inclusion Strategy, along with providing substantial development opportunities in central locations accessible to all sections of the community;
 - promoting public transport and equitable access to services, facilities and employment opportunities for all the community; and
 - specific zonings both for social housing and accommodation for the Travelling Community.
- Protecting the City’s Natural Environment through:
 - the focus of development opportunities within the urban footprint to reduce the need for greenfield expansion and accordingly to protect the quality landscapes that provide the unique city setting;
 - positive protection of the Lagan Valley Regional Park;
 - protecting existing parks, green areas and the shores of Belfast Lough;
 - designating 18 Historic Parks, Gardens and Demesnes;
 - designating 68 Local Landscape Policy Areas to protect areas of distinctive landscape and amenity;

- designating 34 Sites of Local Nature Conservation Importance to enhance the conservation of bio-diversity and protect priority habitats; and
- designating nine Community Greenways and four Urban Landscape Wedges.
- Promoting an integrated and inclusive Transport System, consistent with the City’s role as a major gateway to Northern Ireland and as the heart of the Regional Strategic Transport Network (RSTN) through:
 - effective integration of land use and transportation;
 - promoting the use of public transport with requirements for provision of facilities in conjunction with development in certain land use zonings;
 - seeking to reduce the number of car journeys made during peak periods by controlling non-operational car parking within designated Areas of Parking Restraint in Belfast City Core, City Fringe and in Commercial Nodes on Arterial Routes;
 - promoting walking and cycling through two proposed additional bridge crossings over the River Lagan; and
 - protection for strategic and non-strategic road schemes in the City.

Although not identified as a strategic road scheme proposal within Part Four of BMAP, a number of strategic transportation schemes have been identified within Part Three of the Plan, including:

- York Street Interchange (Westlink/M2/M3 junction); underpasses under Lagan road and Dargan rail bridges; and new bridges at York Street and Dock Street.

The movement of goods to, from and within the Plan Area is a fundamental element of the economy of the area and the wider Region. Proposed enhancements to the Strategic Highway Network will facilitate safe and efficient long distance movements of people and freight within the Plan Area.

Measures proposed will benefit freight transport, building upon the wider commitment of the RTS to improve the Region’s Strategic Highway Network. The measures include improvements to the BMA’s Strategic Road Network with particular emphasis on relieving existing bottlenecks and provision of better access to Regional Gateways and Major Employment Locations.

2.4.6.2.2 Belfast Metropolitan Area Plan 2015 Judicial Review

In October 2014 Arlene Foster, Minister for the Department of Enterprise, Trade and Investment (DETI) publically announced her intention to Judicial Review (JR) the approval of the BMAP without the agreement of the full Northern Ireland Executive. Should an application for leave and subsequent JR be successful, the status of the plan would revert to draft and new consultation processes would be put in place to bring it forward to adoption once again. At the time of writing this ES, BMAP is the finally adopted plan and has not yet been subjected to any JR process; it has therefore been fully considered. As the Belfast Metropolitan Transportation Plan is a separate document, any judicial challenge on BMAP will not affect the assessment of the Proposed Scheme.

2.4.6.3 ***The Investment Strategy for Northern Ireland***

The Programme for Government (PfG) 2011-2015 document published in March 2012 sets out the Northern Ireland Executive's strategic priorities and key plans for investment in Northern Ireland for the period 2011-2015. This PfG has been used to update the priorities contained within the Investment Strategy for Northern Ireland (ISNI) for 2011-2021.

The ISNI (originally launched in December 2005), set a new, comprehensive approach to be used by government to make informed decisions as to the investment priorities for Northern Ireland for the ten year period from 2005-2015.

The ISNI confirmed that implementation of the existing RTS was already bringing considerable investment in the roads network across Northern Ireland. To achieve the aspirations of the economic vision for Northern Ireland required an even more forward looking approach, to ensure key infrastructure was in place so that Northern Ireland is prepared for inward investment. ISNI confirmed plans to commence additional investment that would result in higher standard roads providing improved access for commercial traffic, buses and private cars, mainly on the KTCs connecting Northern Ireland's major cities, including key cross-border routes. This would be the start of what could become a £1bn investment on the strategic network that would allow additional major improvement schemes over and above those identified in the RSTN TP.

A revised ISNI, for the ten year period 2008 to 2018, was published in 2008 and indicated an investment of £3.1bn in roads infrastructure. Approximately £2.5bn was targeted at the Strategic Road Network and included major schemes on the key strategic routes. A daughter document of the ISNI, the DRD Investment Delivery Plan (IDP) for Roads, provides additional detail on future infrastructure investments, organisational capacity and delivery arrangements for the strategy envisaged in ISNI.

In October 2012, the ISNI 2011-2021 was published. This document updated the Investment Strategy in line with the new budget period and reflects the priorities of the PfG. It highlights progress made to date and sets out the next phase of investment in key projects and programmes. While the resolve to invest remains resolute, the scale and focus on investments is updated to reflect the economic climate, with a shift in focus to protecting jobs, fostering economic recovery and protecting public services. The decision of the current Coalition Government in Westminster to cut public spending meant that there would be less money than had been previously anticipated. The Strategy is focused on prioritising infrastructure programmes that will deliver the best return in the period ahead.

The ISNI 2011-2021 confirms that investment in efficient, reliable, competitive and sustainable networks (roads, public transport, gateways, telecoms, energy) is critical to the growth of a dynamic and innovative economy. Investment on the roads network will reduce journey times, improve safety and provide enhanced access to urban centres and inter-regional gateways.

In terms of on-going work, the strategy notes that development work will continue on a range of major projects including the A6 between Derry~Londonderry and Dungiven, and the Westlink/York Street junction.

2.5 **Proposed Scheme Context**

2.5.1 ***Expanding the Strategic Road Improvement Programme 2015 – Consultation Document***

The launched ISNI (published in December 2005), identified an additional £400M for the Transport NI SRI Programme that was in place at the time of publication. In response to this expanded programme of investment, Transport NI developed a list of additional SRIs as part of an Expanded SRI Programme.

The proposed Expanded SRI Programme, like the RSTNTP, was based on the guidance set out in the RDS and the RTS. The selection was based on the Government’s five key objectives for transport of environment, safety, economy, accessibility and integration. It built upon the extensive work undertaken for the RSTNTP and among other objectives aimed to address bottlenecks on the strategic road network, giving priority to the KTCs, Link Corridors and then the Trunk Roads.

The Expanded SRI Programme was balanced across Northern Ireland and included major improvements necessary to deal with bottlenecks and safety concerns. As part of these improvements, a grade-separated junction was identified at York Street. This was set out within Annex B of the published consultation document, as detailed in Table 2.1.

Table 2.1: Proposed additional SRI schemes to be added to programme, subject to consultation

Proposed additional SRI schemes to be added to programme, subject to consultation		
Scheme	Description	Cost (£ M)
Eastern Seaboard Corridor		
Westlink/York St flyover	Provide grade separated junction at the last remaining part of Westlink which has a traffic signalled junction	£ 50M

Source: Extract from *Expanding the SRI Programme 2015 Consultation Document, Annex B.*

The consultation process for the Expanding the Strategic Road Improvement Programme 2015 – Consultation Document commenced on 31 July 2006 and continued until 29 September 2006. The document was consulted upon widely and during this period there were no adverse reactions to the programme of works proposed at York Street.

Based on the above, the Expanded SRI programme builds on the RDS and RTS, and therefore is considered to have the same strategic policy status.

2.5.2 Expanding the Strategic Road Improvement Programme 2015 – Draft Environmental Report

A draft Environmental Report for the Strategic Environmental Assessment of the Expanded SRI Programme was prepared and published for consultation in July 2006. The consultation process for the draft Environmental Report also commenced on 31 July 2006 and continued until 29 September 2006.

The draft Environmental Report noted that the Expanded SRI Programme was one aspect of the ISNI which was multi-modal in nature. The ISNI proposed investment in rail network renewal and new buses to improve travel times and accessibility by all modes across Northern Ireland.

The expanded SRI programme was based on the RDS, the RTS and the RSTNTP. Improved strategic road links have the potential to provide beneficial impacts across the Government’s five key criteria.

The document was adopted by the Department and included Summary Tables indicating the Environmental Assessment Impacts of the schemes. The assessment for the Westlink/York Street Flyover is reproduced in Table 2.2.

Table 2.2: Environmental Impacts identified from SEA Environmental Report

Eastern Seaboard Corridor – Westlink/York Street Flyover				
Theme	Appraisal Criteria	Effects	Summary of Effects	Comments
Environment	Biodiversity	0	In general, proposed works are within an urban environment and will have no impact on biodiversity.	
	Countryside	0	Proposed works are within an urban environment and will have no impact on the countryside.	
	Climate Change & Air Pollution	✓	Proposed works will relieve congestion in an urban area. This is expected to result in improved air quality in this vicinity. Air quality will be the subject of assessment as part of the detailed scheme appraisal process. It should be noted that the additional capacity provided by proposals may also lead to induced traffic which may erode benefits to climate change.	
	Management of the Water Environment	0	In general, proposed road scheme is within an urban environment and does not include a significant increase in impermeable surfaces and will have no noticeable impact on the water environment.	
	Mineral Resources (Mineral Conservation)	X	The construction of proposed new highway schemes will increase the use of mineral reserves.	Use recycled materials where practicable.
	Waste Disposal	X	The construction of proposed new highway schemes will result in waste material.	Recycle waste material where practicable.
	Energy Efficient Transport Modes	X	Proposed works will not formally promote efficient transport modes and have the potential for encouraging further car use.	
	Built and Archaeological Heritage	0	Proposed works do not impact on designated sites of national and international importance.	
	Urban Environmental Quality	✓	Proposed works will improve the access arrangements to the Strategic Highway Network and reduce congestion and may be associated with local urban regeneration.	
Quality of Life	Current Needs	✓	Proposed new highway schemes will provide for the needs of the current generation.	

Eastern Seaboard Corridor – Westlink/York Street Flyover			
	Unemployment/Poverty	✓	The construction of proposed new highway schemes will provide substantial employment opportunities. The proposals would contribute to the removal of bottlenecks within settlements and would therefore permit more reliable journey times for business and freight movement.
	Education	-	Proposed new highway schemes will have no impact on education.
	Crime	-	Proposed new highway schemes will have no impact on crime.
	Housing Conditions	-	Proposed new highway schemes will have no impact on housing conditions.
	Public Health	✓	Proposed works will remove a congested signalised arrangement connecting three strategic routes and replace this with a grade separated solution. This should have a positive impact on road casualties.
Key to Effects:			
	✓ Positive		- No relationship
	X Negative		? Relationship uncertain
	0 Neutral relationship		

Source: Extract from Annex B of Expanding the Strategic Road Improvement Programme 2015 Consultation Document

The draft Environmental Report highlighted the positive and negative aspects of the scheme, including the improved access arrangements to the strategic road network with reduced congestion and possible urban regeneration, but noted that the scheme would not formally promote efficient transport modes and had the potential for encouraging further car use.

The Expanded SRI Programme, which focuses on road improvements, is one aspect of the ISNI. In addition, the ISNI also proposes investment in rail and new buses to improve travel times and accessibility by all modes across Northern Ireland.

The scheme should also deliver benefits to public transport bus services that are currently delayed when passing through the series of signalised junctions to contribute towards the ISNI objectives for improved travel times by all modes of transport.

Following closure of the consultation period, the scheme was included in the Investment Delivery Plan (IDP) for Roads document.

2.5.3 **Investment Delivery Plan for Roads**

The IDP for Roads indicates that Transport NI, in developing a SRI Programme, has ensured that the contribution to the Northern Ireland Executive's three cross-cutting strategic objectives of ISNI (economic, societal and environmental) has been maximised.

The SRI Programme is managed under the categories set out in RSPPG_E030, namely the Construction Programme, the Preparation Pool and the Forward Planning Schedule.

The IDP for Roads indicates that:

“The Strategic Road Improvement Programme is based on the guidance set out in the Regional Development Strategy and the Regional Transportation Strategy and builds on the work of the Regional Strategic Transport Network - Transport Plan. The Programme aims to develop the strategic road network, targeting bottlenecks, in order to make all areas of the Province readily accessible to the Regional Gateways and the Belfast Metropolitan Area; and thus endeavouring to help the region realise its economic potential and make it as attractive as possible to future investors.”

Transport NI has set in place a strategy to ensure the delivery of unprecedented levels of capital roads investment envisaged through ISNI.

Annex 1 in the IDP for Roads shows the programme of SRIs that are proposed over the 10 years of the ISNI period to 2017/18. This includes a summary of major investment in roads and confirms that the grade-separated junction for the York Street/M2/M3 intersection on the Westlink is included in the IDP, as extracted into Table 2.3 below.

Table 2.3: Programme of SRIs proposed over next 10 years of ISNI period

Profile Title and Description	Capital Value (£m) Current Prices	Anticipated Procurement Route ¹	Indicate Next Gateway Stage ²	Anticipated Date of Advertisement to market	Estimated Completion Date / Delivery Date	Location
Westlink / York Street Flyover <i>Grade separated junction for the York St/M2/M3 intersection on the Westlink</i>		D&B	Gateway 1	2013/14 to 2017/18		Belfast
Notes:						
1	<i>Procurement route stated is most likely option from (a) PFI/PPP; (b) Design and Build; (c) Conventional Procurement</i>					
2	<i>Gate 0: Strategic Assessment Gate 1: Business Justification Gate 2: Procurement Strategy Gate 3: Investment Decision Gate 4: Readiness for Service Gate 5: Benefits Evaluation</i>					

Source: Extract from Annex 1 of the Investment Delivery Plan for Roads

3. ALTERNATIVES CONSIDERED

3.1 Introduction

Part V of The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 [as amended] requires that an outline of the main alternatives studied by the Department and an indication of the main reason for its choice (taking into account the environmental effects) is reported in the ES.

The study of alternatives for major road schemes is undertaken in line with Transport NI's three-stage appraisal procedure, which reflects the requirements of DMRB Volume 5, Section 1, Part 2 (TD 37/93) 'Scheme Assessment Reporting'. This DMRB Standard sets out the general requirements for the reporting of scheme assessments by the Department and through the reporting process aims to:

- permit consideration of likely environmental, economic and traffic effects of alternative proposals; and
- allow the public and statutory bodies to comment on proposals, taking account of their environmental, economic and traffic implications.

Scheme assessment reports act as a summary of the more technical reports generated during the appraisal of road schemes. They are written to be unbiased and easy to read using a factual style, which describes both the advantages and disadvantages of routes or corridors; their principal audience is the public. Undertaken through a three-stage procedure, the level of detail and coverage of the assessment report is appropriate to the type of decision that can reasonably be taken at each stage:

- Stage 1 Scheme Assessment – identification of the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with broadly defined improvement strategies. This concludes in the selection of a number of potential routes or scheme options, as reported in the summary Preliminary Options Report;
- Stage 2 Scheme Assessment – identification of the factors to be taken into account in choosing alternative routes or improvement schemes and to identify the environmental, engineering, economic and traffic advantages and constraints associated with those routes or schemes. This concludes in the selection of a preferred route or scheme option, as reported in the summary Preferred Options Report; and
- Stage 3 Scheme Assessment – clear identification of the advantages and disadvantages, environmental, engineering, economic and traffic terms of the preferred route or scheme option, as reported in the summary Proposed Scheme Report. A particular requirement at this stage is an assessment of the significant environmental effects of the project, in accordance with the requirements of the EIA Directive and required by Part V of The Roads (Northern Ireland) Order 1993 as substituted by the Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 1999 and amended by The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 2007, implementing EC Directive 85/337/EEC as amended by Council Directive 97/11/EC and 2003/35/EC.

As noted in Sub-Section 1.2, the Proposed Scheme Report has been structured into two distinct parts:

- Part 1 (this ES); and
- Part 2 (the Engineering, Traffic and Economic Assessment Report).

3.2 Stage 1 Scheme Assessment

As noted above, the DMRB approach to a Stage 1 Scheme Assessment requires the identification of a number of broad improvement strategies. A number of alternative schemes were initially considered, including public transport and road and traffic measures. However, in the case of all alternative schemes, it was identified that the scheme objectives could not be met through such measures alone without removing the bottleneck at the existing York Street signalised junction. Accordingly, a number of grade-separated junction options were developed and assessed.

When developing these options, the conventional concept of route corridors presented a challenge (i.e. a number of route options developed within the confines of a number of identified route corridors). In the case of a rural bypass scheme, this approach would require designers to look at corridors that would divert traffic around the area to be bypassed. For this particular scheme, the identified site constraints were such that this approach had to be revised. Instead, this assessment considered route corridors that followed the same general direction (in plan), with alternative vertical alignments.

The existing Lagan and Dargan bridges provided a point of reference for these corridors and so, the concept of 'elevated', 'depressed' and 'combined' corridors was established for road links between Westlink and M2, relative to these structures. Elevated corridors were those where links between Westlink and M2 were vertically aligned above the existing Lagan and Dargan bridges, with depressed corridors in contrast being those where links were vertically aligned below the existing bridges. Some options used elements of both corridors and so, these were termed 'combined' corridors.

On the basis of this approach, six Preliminary Options were identified that comprised elevated, depressed and combined corridors and these were subject to separate engineering, environmental, traffic and economic assessments. In 2009, URS completed its Stage 1 Scheme Assessment with the findings reported in the '*Preliminary Options Report*' of March 2009. The report identified that the scheme would provide significant benefits to the region and recommended:

- the shortlisting of four of the identified six Preliminary Options as options to provide full or partial grade-separation;
- further consideration be given to maximising land availability and access to isolated parcels of land;
- the adoption of appropriate design standards to reflect driver perception, the provision of maintenance access and the extension of the Active Traffic Management system on the Westlink to maximise capacity; and
- further consideration of the buildability of the scheme, the phasing of various elements and disruption due to construction.

The recommendations of the report were endorsed by the Transport NI Board at its meeting of 26 March 2009.

3.3 Stage 2 Scheme Assessment

Further to the recommendations arising from the Stage 1 Scheme Assessment, four of the six Preliminary Options were shortlisted for further assessment in line with the recommendations of the Preliminary Options Report. The engineering designs of the options were developed in more detail through consultations with various statutory and non-statutory bodies, with a

formal public consultation period held in June 2011 to allow members of the public to view and comment upon the proposals.

The developed four options (termed Options A, B, C and D) proposed the introduction of grade-separation at the existing junction using various alignments (as shown on the plates below).

3.3.1 Option A

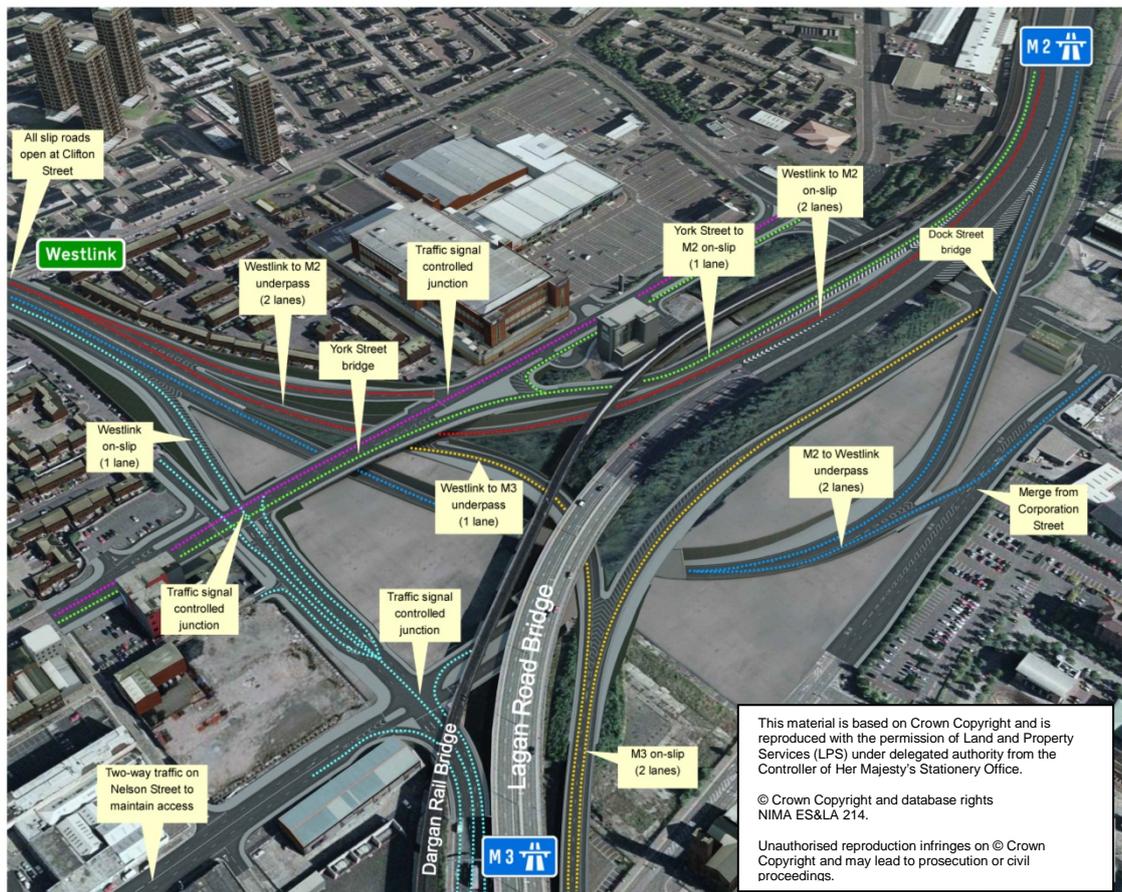


Plate 3.1: Option A

Option A proposed partial grade-separation of the junction. Grade-separation was provided for movements between Westlink and M2 via alignments in underpasses below the existing Lagan and Dargan bridges. The Westlink to M3 movement was also grade-separated via a new underpass. York Street was partially raised to accommodate the underlying links. The M3 to Westlink movement, however, remained subject to signal control at Nelson Street and York Street. All north-facing sliproads at Clifton Street remained open in the proposed layout.

3.3.2 Option B



Plate 3.2: Option B

Option B proposed full grade-separation of movements between the Westlink, M2 and M3. Grade-separation was provided via alignments in both underpasses below and overbridges above Lagan and Dargan bridges. York Street was raised relative to its current position to facilitate the underlying links, with overbridges spanning over the street. All north-facing sliproads at Clifton Street remained open in the proposed layout.

3.3.3 Option C

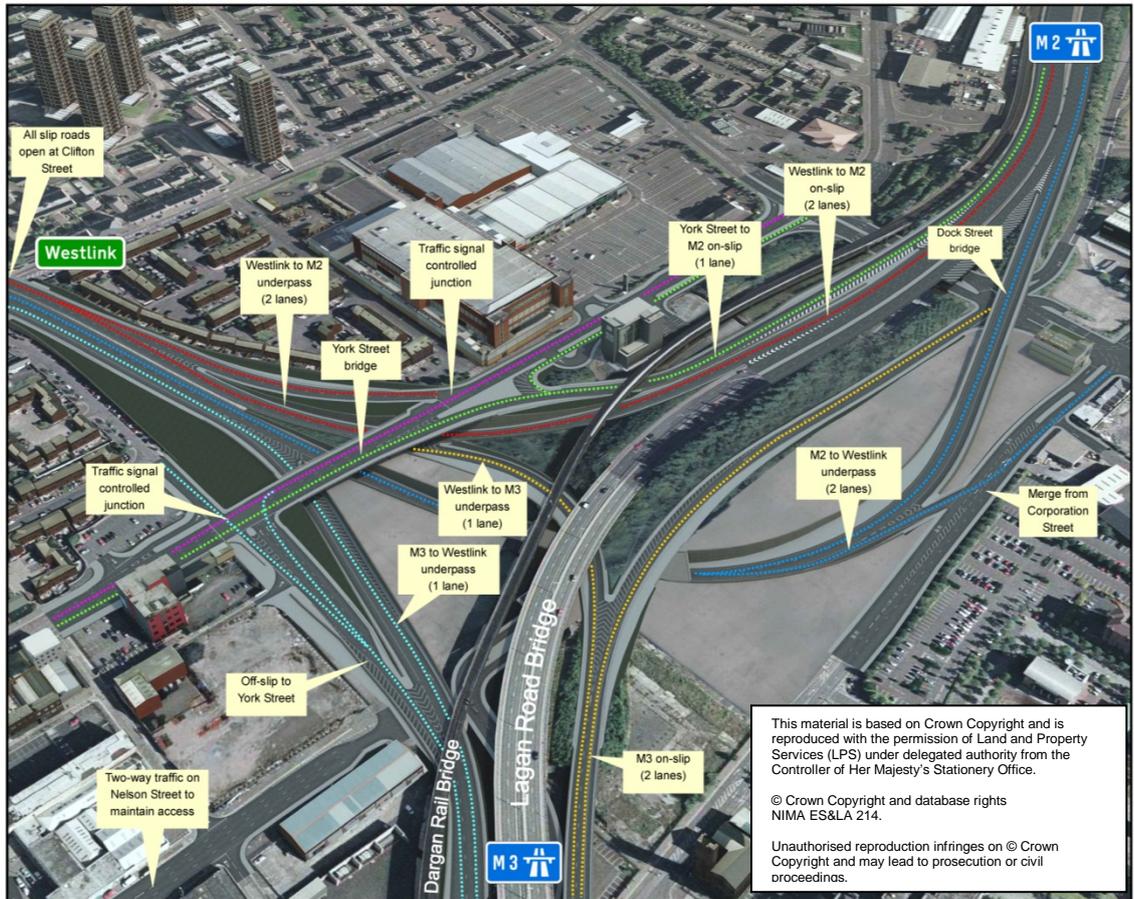


Plate 3.3: Option C

Option C proposed full grade-separation of movements between the Westlink, M2 and M3. Grade-separation was provided via underpasses below Lagan and Dargan bridges. York Street was partially raised to accommodate the underlying links. All north-facing sliproads at Clifton Street remained open in the proposed layout.

3.3.4 Option D

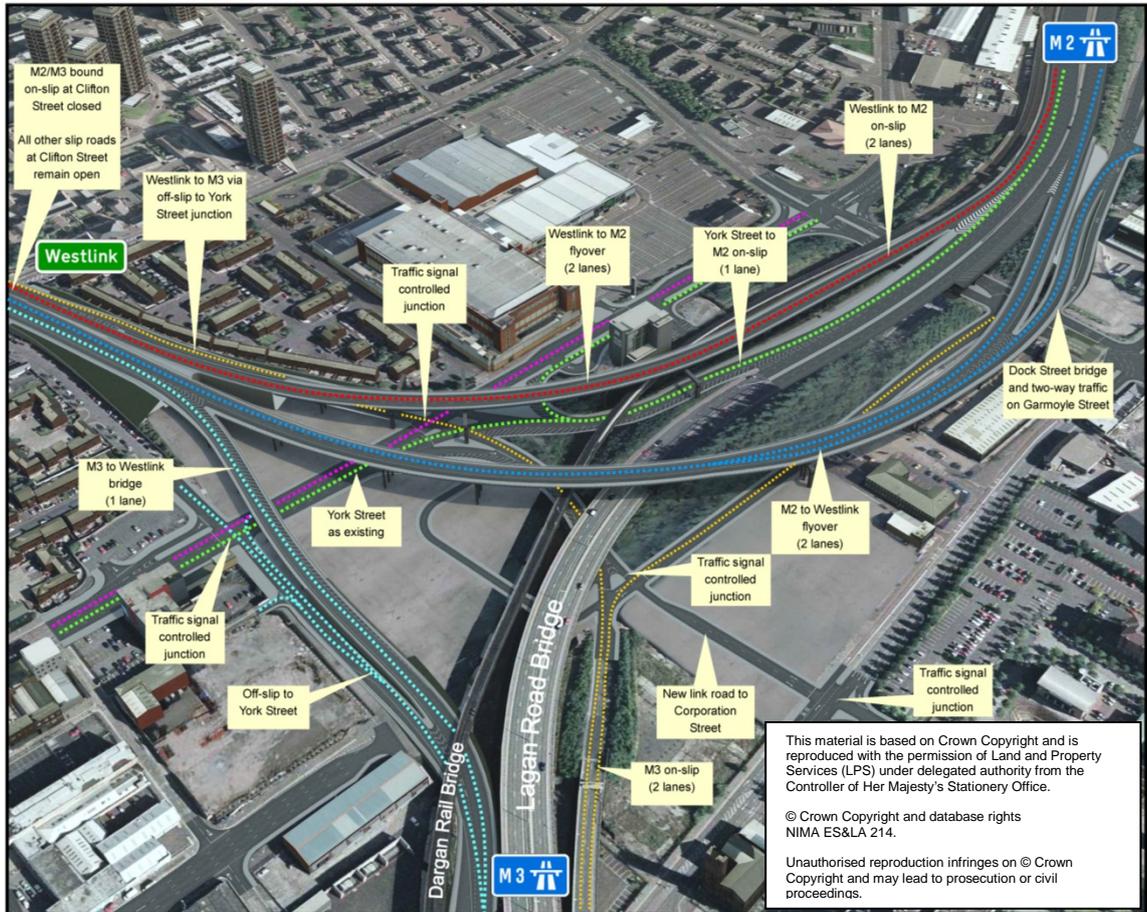


Plate 3.4: Option D

Option D proposed partial grade-separation of the junction. Grade-separation was provided for movements between Westlink and M2 via road alignments on overbridges above the Lagan and Dargan bridges. A grade-separated M3 to Westlink movement was provided with an overbridge across York Street. The provision of links between Westlink and M2 allowed York Street to remain at its current level, minimising the works required at the junction. However, it was not possible to grade-separate the Westlink to M3 movement in this option, with the movement subject to signal control at York Street and Nelson Street. To facilitate the proposed Westlink to York Street slip road and in turn, to facilitate the Westlink to M3 movement, it was necessary to close the northbound onslip from Clifton Street, in the direction of the M2/M3. The offslip from Westlink to Clifton Street remained open.

3.3.5 Stage 2 Scheme Assessment findings

Following their identification and refinement, the options were subject to separate engineering, environmental, traffic and economic assessments in accordance with the requirements of the DMRB.

The economic assessment found that Option D would not provide economic benefits to the region if selected as the Preferred Option. The assessed economic disbenefits for Option D outweighed its assessed benefits by a ratio of approximately 2:1. It was considered that the

proposed closure of Clifton Street on-slip and the resulting reassignment of traffic onto the Inner Ring contributed to its assessed economic performance. In light of the economic findings, it was recommended that Option D should not form the Preferred Option for the scheme.

The assessed economic performance of Options A, B and C remained positive, with all the remaining options presenting an overall economic benefit if selected as the Preferred Option for the scheme.

To distinguish the options, the scheme objectives were reviewed with the findings from the engineering, environmental, traffic and economic assessments. Views on the scheme options expressed in response to the public consultation were also taken into account. The review found that the options perform at a broadly similar level, with each option having respective advantages and disadvantages.

Taking into consideration its overall performance across the scheme objectives and the views raised in response to the public consultation, it was recommended that Option C be selected as the Preferred Option for the scheme and further developed in line with the engineering standards set out in the DMRB to a level sufficient for a Stage 3 Scheme Assessment. The findings from the assessment were reported in the *'Preferred Options Report'* of October 2012, identifying that several options would present benefits to the region.

The recommendations of the report were endorsed by the Transport NI Board at its meeting of 26 October 2012. The Minister for Regional Development subsequently made the public announcement of the Preferred Option for the scheme on 06th December 2012.

In developing the option further, it was recommended that the following engineering and operational issues be given further consideration:

- The potential reintroduction of two-way running on York Street to provide a southbound lane. The use of the southbound lane should reflect Transport NI transport policy for the Belfast City Centre;
- The protection of the underpass, so that it remains operational during a Q₁₀₀ river flood event, or a Q₂₀₀ coastal flood event;
- The links and junctions identified to be over-capacity in the 2034 design year by the traffic and economic assessment;
- The proposed drainage system and outfall arrangements, in consultation with NI Water;
- The operational capacity of the interchange, through specialist micro-simulation modelling;
- The engineering solutions to the proposed underpasses and bridges, through consultation with specialist contractors;
- The proposed replacement of the retaining walls on Little George's Street and Great George's Street;
- The proposed diversion of existing utilities, through consultation with the various utility providers; and
- The temporary traffic management measures required to build the scheme whilst mitigating disruption to road users.

3.4 Stage 3 Scheme Assessment

Following the announcement of the Preferred Option, URS was commissioned to develop a preliminary design of the scheme, now termed the Proposed Scheme, to facilitate a subsequent Stage 3 Scheme Assessment and to inform the preparation of a draft Designation Order, draft Vesting Order and this ES.

In developing the Proposed Scheme, URS has reviewed all aspects of the engineering design in conjunction with Transport NI and other statutory bodies. The findings from the public consultation at Stage 2 were also reviewed, along with the content of the prepared Non-Motorised User Context Report.

Further to the review of the design, a number of potential changes in the layout were proposed that were considered to provide benefit to the scheme. These changes were presented to Transport NI and approved by its Eastern Division Approvals Group in September 2013.

Relative to the announced Preferred Option layout, the Proposed Scheme layout has been modified to:

- re-introduce two-way running on York Street, with the provision of a southbound bus/cycle lane and a northbound cycle lane, complementing traffic management policy for Belfast City Centre;
- provide additional diverge capacity from Westlink to M3 through the widening of North Queen Street bridge on its northern side;
- remove the former slip road to the Westlink from Corporation Street, through provision of a new slip road arrangement at Duncrue Street;
- provide a revised left-in, left-out arrangement on the M3 off-slip to York Street, maintaining access to the City Centre, complemented with a reduction in carriageway width on Nelson Street;
- provide access to potentially surplus lands between the M2 motorway and the new M2 to Westlink interchange link, through a revised junction arrangement at Dock Street and a revised layout of the Dock Street to M3 slip road;
- relocate the proposed pumping station for the scheme to lands between the M2 to Westlink and M3 to Westlink interchange links;
- realign the M3 to Westlink underpass to improve its vertical alignment and increase the area of lands that could be potentially declared surplus upon completion at the M3 to York Street off-slip;
- revise the cross-section of the Westlink to York Street slip road to complement predicted traffic flows; and
- provide flood protection to the scheme through a combination of permanent and temporary measures.

In addition to the EIA reported upon in this ES, separate engineering and traffic & economic assessments were carried out, with summary findings reported as a separately published Proposed Scheme Report. This report is freely available on the DRD website at: www.drdni.gov.uk/yorkstreet.

4. SCHEME DESCRIPTION

4.1 General Scheme Description

4.1.1 Overview

This chapter presents a summary of the key elements of the Proposed Scheme, with the engineering aspects described in detail in Section 4 (Engineering Assessment) of the Engineering, Traffic and Economic Assessment Report which forms Part 2 of the overall Proposed Scheme Report (akin to a Stage 3 Scheme Assessment Report). This report is available on the Department for Regional Development (DRD) website at: www.drdni.gov.uk/yorkstreet.

Table 4.1 presents a summary of drawings that illustrate the key features of the Proposed Scheme, with reference to the various numbered Series of the Specification for Highway Works (SHW). These are included in the Engineering, Traffic and Economic Assessment Report Stage 3 Scheme Assessment Report of the overall Proposed Scheme Report (akin to a Stage 3 Scheme Assessment Report). Of these, the following have been included within this ES:

- Link Reference Plan (Figure 4.1);
- Structures Location Plan (Figure 4.2);
- General Arrangement (Figure 4.3);
- Plan and Profiles (Figure 4.4); and
- Construction Sequence (Figure 4.5).

Table 4.1: Relevant Drawings Illustrating Proposed Scheme

Description	Relevant SHW Series No.	Relevant Drawing No(s).
Link Reference Plan	N/A	YSI-URS-XX-XX-DR-RE-IM000 YSI-URS-XX-XX-DR-RE-IM001
Structures Location Plan	N/A	YSI-URS-XX-XX-DR-SE-ST001
General Arrangement	N/A	YSI-URS-XX-XX-DR-RE-GE001 YSI-URS-XX-XX-DR-RE-GE002
Plan and Profiles	N/A	YSI-URS-XX-XX-DR-RE-GD001 to YSI-URS-XX-XX-DR-RE-GD011 inclusive
Cross-Sections	N/A	YSI-URS-XX-XX-DR-RE-GD100 to YSI-URS-XX-XX-DR-RE-GD165 inclusive
Design Speeds and Speed Limits	N/A	YSI-URS-XX-XX-DR-RE-GD201

Description	Relevant SHW Series No.	Relevant Drawing No(s).	
Junctions	N/A	YSI-URS-XX-XX-DR-RE-GD300 to YSI-URS-XX-XX-DR-RE-GD315 inclusive	
Temporary Traffic Management Arrangements	N/A	YSI-URS-XX-XX-DR-RE-TM001 to YSI-URS-XX-XX-DR-RE-TM014 inclusive	
Site Clearance	200	YSI-URS-XX-XX-DR-RE-SC001 to YSI-URS-XX-XX-DR-RE-SC017 inclusive	
Fencing	300	YSI-URS-XX-XX-DR-RE-FE001	
Road Restraint Systems	400	YSI-URS-XX-XX-DR-RE-RR101	
Drainage	500	YSI-URS-XX-XX-DR-DR-00022 YSI-URS-XX-XX-DR-DR-00024 YSI-URS-XX-XX-DR-DR-00025 YSI-URS-XX-XX-DR-DR-00027 YSI-URS-XX-XX-DR-DR-00028 YSI-URS-XX-XX-DR-DR-00039	YSI-URS-XX-XX-DR-DR-00040 YSI-URS-XX-XX-DR-DR-00041 YSI-URS-XX-XX-DR-DR-00203 YSI-URS-XX-XX-DR-DR-00206 YSI-URS-XX-XX-DR-DR-00207
Earthworks	600	YSI-URS-XX-XX-DR-RE-EW101 YSI-URS-XX-XX-DR-RE-EW102	YSI-URS-XX-XX-DR-RE-EW103 YSI-URS-XX-XX-DR-RE-EW201
Pavements, Kerbs, Footways and Paved Areas	700 1100	YSI-URS-XX-XX-DR-RE-PK001 to YSI-URS-XX-XX-DR-RE-PK019 inclusive	
Traffic Signs and Road Markings	1200	YSI-URS-XX-XX-DR-RE-RS001 YSI-URS-XX-XX-DR-RE-RS002	YSI-URS-XX-XX-DR-RE-RS003
Traffic Signals	1200	YSI-URS-XX-XX-DR-RE-TS001 YSI-URS-XX-XX-DR-RE-TS002	YSI-URS-XX-XX-DR-RE-TS003 YSI-URS-XX-XX-DR-RE-TS004
Road Lighting	1300 1400	YSI-URS-XX-XX-DR-YL-00000 to YSI-URS-XX-XX-DR-YL-00008 inclusive YSI-URS-XX-XX-DR-RE-LE001	
Motorway Communications	1500	YSI-URS-XX-XX-DR-EE-MC001 to YSI-URS-XX-XX-DR-EE-MC006 inclusive	

Description	Relevant SHW Series No.	Relevant Drawing No(s).	
Bridges	1600-2500, 5000	YSI-URS-BR-01-DR-SE-00001 YSI-URS-BR-01-DR-SE-00002 YSI-URS-BR-2A-DR-SE-00001 YSI-URS-BR-2B-DR-SE-00001	YSI-URS-BR-03-DR-SE-00001 YSI-URS-BR-04-DR-SE-00001 YSI-URS-BR-05-DR-SE-00001 YSI-URS-BR-06-DR-SE-00001
Culverts	1600-2500, 2700	YSI-URS-CU-01-DR-SE-00001	
Lagan Bridge Foundation Works	1600-2500	YSI-URS-FS-01-DR-SE-00001	
Dargan Bridge Foundation Works	1600-2500	YSI-URS-DF-XX-DR-SE-00001	
Pumping Station	500,1600-2500	YSI-URS-PS-01-DR-SE-00001	
Retaining Walls	1600-2500	YSI-URS-RW-01-DR-SE-00001 YSI-URS-RW-04-DR-SE-00001 YSI-URS-RW-07-DR-SE-00001 YSI-URS-RW-17-DR-SE-00001 YSI-URS-RW-18-DR-SE-00001 YSI-URS-RW-20-DR-SE-00001 YSI-URS-RW-21-DR-SE-00001 YSI-URS-RW-22-DR-SE-00001	YSI-URS-RW-24-DR-SE-00001 YSI-URS-RW-25-DR-SE-00001 YSI-URS-RW-26-DR-SE-00001 YSI-URS-RW-27-DR-SE-00001 YSI-URS-RW-28-DR-SE-00001 YSI-URS-RW-29-DR-SE-00001 YSI-URS-RW-34-DR-SE-00001
Underpasses	1600-2500	YSI-URS-UP-1A-DR-SE-00001 YSI-URS-UP-1A-DR-SE-00003 YSI-URS-UP-1B-DR-SE-00001 YSI-URS-UP-2A-DR-SE-00001	YSI-URS-UP-2B-DR-SE-00001 YSI-URS-UP-GE-DR-SE-00001 YSI-URS-UP-GE-DR-SE-00002
Variable Concrete Step Barrier	400 1700	YSI-URS-VC-01-DR-SE-00001	
Utilities	2700	YSI-URS-XX-XX-DR-UT-00011 YSI-URS-XX-XX-DR-UT-00043	YSI-URS-CU-01-DR-SE-00001
Landscaping and Ecology	3000	YSI-URS-XX-XX-DR-EN-LD001 to YSI-URS-XX-XX-DR-EN-LD007 inclusive	

4.1.1.1 ***New Road Links***

As shown on Figure 4.1, the Proposed Scheme would provide a fully grade-separated interchange to replace the existing signalised gyratory junction. Interchange links between Westlink, M2 and M3 would be provided in underpasses aligned beneath new bridge structures at York Street and under the existing Dargan and Lagan bridges. The existing North Queen Street and Dock Street overbridges and Whitla Street subway structure would be widened as necessary to accommodate the new road layout, with another new overbridge structure proposed at Dock Street. Retaining walls and piled embankments would be provided as required to support the new road alignments. Connections from the local street network to the new interchange links would be provided at Clifton Street, York Street, Dock Street and Duncrue Street in the form of on-slips. Connections from the strategic road network to the local street network would be provided in the form of off-slips from interchange links at Clifton Street, York Street and Nelson Street. The existing north-facing on and off-slip roads at Clifton Street would remain open within the proposed road layout.

4.1.1.2 ***Site Clearance***

Site clearance works would be required across the site to remove existing street furniture and where required, existing amenity planting vegetation. Existing vegetation on the Westlink embankments at Little George's Street and Great George's Street would require removal, in addition to vegetation on the existing M2 embankment between Lagan Bridge and Duncrue Street.

The existing Transport NI section office and associated outbuildings at Corporation Street, in addition to the larger DVA office building, would also require demolition and subsequent removal. Other privately-owned buildings scheduled for demolition would include the existing Focus Security Solutions premises at Corporation Street and the single-storey buildings located to the north of Philip House at York Street.

4.1.1.3 ***Fencing***

The Proposed Scheme would include provision of new boundary fencing and/or other suitable boundary treatment at the periphery of the scheme, necessary to secure the boundaries of the Westlink, M2 and M3. The proposed boundary treatment measures could include options such as post and rail fencing, paladin fencing or other bespoke solutions for future development opportunity sites post construction.

The Noise and Vibration assessment (as detailed within Chapter 13 of this ES) has also identified that noise barriers would be required along the northbound and southbound carriageways of Westlink (Link Nos. 1 and 2) either side of North Queen Street Bridge.

4.1.1.4 ***Road Restraint Systems***

The Proposed Scheme would include the provision of suitable road restraint systems, including vehicle and pedestrian restraint systems in accordance with Standard TD19/06 of the DMRB. Within the various underpasses, the associated retaining walls would be provided with a smooth finish for a minimum height of 1500mm above the adjacent carriageway level without recourse to a steel safety barrier system. This provision is reflective of what has been provided on the existing Westlink, including recently upgraded sections. Away from the underpasses, steel safety barrier systems would provide normal containment protection to both road users and existing bridge structures. The existing Vertical Concrete Barrier (VCB) forming the central reserve on Westlink would be replaced with a Variable Concrete Step Barrier (VCSB) and a custom in-situ retaining wall.

Parapets would be provided at all bridge structures and at a number of retaining walls to provide normal levels of containment.

At controlled crossing points, pedestrian restraint systems in the form of guardrails would be provided in accordance with Local Transport Note (LTN) 2/09.

4.1.1.5 Drainage

A pumped drainage system would service the proposed underpass structures, with a combination of drainage systems proposed to collect and convey stormwater run-off within the scheme. It is proposed that the system would pump collected stormwater to an existing combined sewer overflow at Gamble Street and outfall to Belfast Harbour. The proposed drainage network is described in more detail within Sub-Section 4.3.

4.1.1.6 Earthworks

The vertical alignment of the proposed road links within the scheme would require construction of various underpasses and embankment structures, described in detail within Sub-Section 4.2.3.

4.1.1.7 Pavements

A detailed assessment of construction and resultant residual life of the existing road pavements in the vicinity of the site has not been carried out on the basis that the majority would require removal to make way for the new interchange links and slip roads that are in new horizontal and/or vertical positions. This is especially true for the existing pavements on Westlink, York Street, York Link, Great George's Street and Nelson Street that comprise the existing junction.

With regard to the condition and residual life of the Westlink, M2 and M3 carriageways beyond the extent of the scheme at the tie-in positions, it should be noted that these are under the management of Highway Management (City) Limited as DBFO concessionaire under the terms of its DBFO Contract. Under the provisions of this contract, the concessionaire is required to regularly inspect and report upon the condition of the existing carriageways and programme remedial works as required to achieve a suitable residual design life upon hand back to Transport NI at the end of the 30-year contract period (2036).

The proposed pavements for the new road links would be provided in accordance with Volume 7 of the DMRB and include a combination of flexible and rigid pavements. Surfacing options would be limited to those permitted by the DMRB, including Hot Rolled Asphalt (HRA) and Thin Surface Course Systems (TSCS). The use of TSCS is proposed for surfacing of the interchange links and slip roads for its noise reduction qualities, whilst HRA would be typically proposed for elements of the surface street network. High Friction Surfacing (HFS) would be provided in accordance with the requirements of the DMRB at appropriate locations.

4.1.1.8 Kerbs, Footways and Paved Areas

As part of the proposed drainage design, upstand half battered kerbs would be provided generally throughout the scheme, with combined kerb drainage (CKD) units used at structures including the proposed bridges and underpasses, and at other areas in the scheme where advantageous to do so. Dropped kerbs would be provided at identified crossing points for pedestrians and other non-motorised users.

Footways would be provided on the new road links at York Street (Link No. 11) and the M3 to York Street off-slip (Link No. 7). It should be noted that footway provision on York Street would be a minimum of 3m in width on both sides of the new bridge structures.

With the removal of York Link and part of Great George's Street for new interchange links and slip roads, the existing footways on these routes would be removed. In addition, the existing footpath between Corporation Street and Nelson Street, that runs under the Lagan Bridge, would be rendered redundant by the proposed road links and therefore would be removed. It would not be possible to replicate this lost provision within the proposed road layout, with the nearest alternative footways for east to west movements via the existing Dock Street, Little Patrick Street and Great Patrick Street footways.

Surfacing options for pavement areas would be in accordance with Volume 7 of the DMRB.

4.1.1.9 Traffic Signs and Road Markings

Traffic signs and road markings would comply with the specification and requirements outlined in the DMRB and prescribed by the Traffic Signs Regulations (Northern Ireland) 1997 [as amended]. The location and type of traffic signs and markings would be developed at the detailed design stage. Traffic signs at the junctions and along the proposed road links would be located within the permanent fence line.

4.1.1.10 Traffic Signals

The Proposed Scheme would include the provision of new traffic signal controlled junctions at the following locations:

- York Street/Great George's Street;
- York Street/Westlink; and
- York Street/Cityside Retail Park/Galway House.

In addition, the following existing signal controlled junctions would require revision to reflect changes introduced by the Proposed Scheme:

- York Street/Great Patrick Street;
- York Street/Dock Street;
- Nelson Street/Great Patrick Street;
- Dock Street/Nelson Street; and
- Duncrue Street/M2 off-slip.

The existing controlled pedestrian crossing at Whitla Street subway on Nelson Street would also require revision as appropriate to reflect changes introduced by the scheme.

4.1.1.11 Road Lighting

As the Proposed Scheme is located within an urban area, it would include provision of a new road lighting system, with revisions to existing road lighting systems as required. It should be noted that separate lighting systems would be developed for systems that would be maintained by Transport NI and the DBFO concessionaire company for the DBFO Package 1 contract.

The proposed road lighting layout is shown on drawings YSI-URS-XX-XX-DR-YL-00000 to YSI-URS-XX-XX-DR-YL-00008 inclusive and drawing YSI-URS-XX-XX-DR-RE-LE001

contained within the Engineering, Traffic and Economic Assessment Report (Stage 3 Scheme Assessment Report). In terms of general specification, it is likely to include:

- 4no. planted root aluminium lighting columns (height 6m) fitted with a post top mounted 12klm led lantern;
- 58no. planted root aluminium lighting columns (height 10m) fitted with a post top mounted 20klm led lantern;
- 10no. twin arm planted root aluminium lighting columns (height 10m) fitted with two 20klm led lanterns;
- 47no. planted root aluminium lighting columns (height 12m) fitted with a post top mounted 31klm led lantern;
- 8no. planted root aluminium lighting columns (height 15m) fitted with a post top mounted 48klm led lantern;
- 2no. twin arm planted root aluminium lighting columns (height 15m) fitted with two 31klm led lanterns;
- 22no. raise and lower lighting columns to be positioned 1m behind flood defence wall to allow access for offline maintenance. Lighting column to be sized to provide 10m nominal height from carriageway and be fitted with a 20klm led lantern;
- 3no. twin arm raise and lower lighting columns to be sized to provide 10m nominal height from carriageway and be fitted with two 20klm led lanterns;
- 6no. flange plated aluminium lighting column (height 12m) to be fitted with a post top mounted 31klm led lantern;
- 6no. wall mounted 12klm led floodlight at a height of 6m above carriageway level; and
- 2no. wall mounted 19klm led floodlight at a height of 6m above carriageway level.

4.1.1.12 Motorway Communications

The Proposed Scheme would include provision of motorway communications equipment for future operation of the scheme by Transport NI. The scope of proposed provision is more particularly described in Sub-Section 4.5.

4.1.1.13 Structures

The vertical alignment of the proposed road links within the scheme would require construction of various structures, including bridges, underpasses, retaining walls, flood walls, embankments, gantries and culverts, as more particularly described in Sub-Section 4.2.3.

4.1.1.14 Utilities

Significant diversions of utilities infrastructure would be required for construction of the Proposed Scheme. Due to the nature of the scheme, these elements include retaining walls, underpasses, bridge piers, bridge abutments, embankments and other minor road alterations, such as kerb realignment and carriageway level alterations. Ground conditions in the study area generally at formation level have low bearing capacity and therefore it would be necessary for foundation strengthening works to be undertaken to provide support to foundations for the proposed retaining walls, bridge piers, bridge abutments and

embankments. The intrusive nature of the works required to construct these individual elements would lead to severance of the existing utilities networks located within the study area, therefore significant diversionary works and mitigation measures would be required to ensure supply networks and systems are not detrimentally affected.

4.1.1.15 Landscaping and Ecology

The Proposed Scheme design would include the provision of landscaping and ecological protection measures, in accordance with the Schedule of Environmental Commitments included within this Environmental Statement.

4.2 Detailed Scheme Description

4.2.1 Link Referencing System

For the purposes of identification, the road links within the footprint of the future Proposed Scheme and its environs have been given a unique reference number, as shown on Figure 4.1. These reference numbers shall be used in the description of the key elements of the scheme. Plan and profile drawings for the links are also included in Figure 4.4.

4.2.2 Road Geometry

4.2.2.1 Strategic Motorway Links

4.2.2.1.1 M2 to M3 (Link No. 8)

The existing M2 within the extents identified for the purposes of reference would remain largely unchanged, with the most significant change being the removal of the existing off-slip from the motorway to Nelson Street. It is not proposed to reduce the width of the existing Dock Street overbridge by a corresponding amount and therefore, the remaining paved width on the existing bridge would remain as an isolated section of wide hard shoulder. It should be noted that a new permanent 50mph speed limit would apply to this section of motorway as part of the Proposed Scheme.

4.2.2.1.2 M3 to M2 (Link No. 9)

The existing M2 within the extents identified for the purposes of reference would remain unchanged from its current layout.

4.2.2.2 Strategic Interchange Links

4.2.2.2.1 Westlink to M2 (Link No. 1)

The link would commence at the existing Clifton Street northbound on-slip merge nose, with online widening of the Westlink and North Queen Street Bridge on the northern side to facilitate a new four-lane weaving section arrangement, where lane widths would be limited to 3.25m, slightly wider than the existing provision, but less than standard lane widths. This requires demolition and replacement of existing retaining walls adjacent to the Westlink and North Queen Street. West of North Queen Street Bridge, the link would lower into a depressed section underneath the new York Street to York Road link (Link No. 11) which would be carried over on a new bridge.

To facilitate online widening between North Queen Street Bridge and York Street overbridge, the associated Westlink embankment requires modification. To avoid works to replace the existing Little George's Street retaining wall, a strengthened earthwork is proposed on the northern side of Westlink for a distance of approximately 100m, with a steepened side slope.

Construction of this strengthened earthwork would require a suitable working platform for piling operations and this would, in turn, require temporary removal of a significant portion of the existing embankment during the construction process.

To provide sufficient headroom to York Street overbridge, Link No. 1 would be lowered by approximately 3m below existing ground level. An underpass structure is proposed, with a single lane diverge to the M3 and two lanes continuing towards the M2. As the link approaches Dargan Bridge, it would rise to match levels on the existing M2 on-slip, with approximately 400mm cover provided to the underlying pile caps. The link then matches the existing alignment on the on-slip to provide a 2-lane lane gain onto the northbound M2 foreshore.

4.2.2.2 M2 to Westlink (Link No. 2)

The link would commence with a two-lane lane drop from the M2 on approach to the existing Dock Street Bridge, with the link passing on a straight overbridge structure over Dock Street.

Once the link passes over Dock Street, it would continue to drop down to below existing ground level in an underpass beneath the Dock Street to M3 (Link No. 6) and Westlink to M3 (Link No. 3) alignments, which are carried over on a roof slab. Two lanes would be maintained in the direction of Westlink. To facilitate this alignment, a number of existing properties would require demolition, including the existing Transport NI depot at Corporation Street.

As the link passes under the Lagan and Dargan bridges, the cross-section would reduce in width to fit through a pinch point created by the existing substructures (particularly pile caps and piers). Clearances to existing substructures are between 400-500mm. In order to fit through, verge widths would be reduced and the nearside hard shoulder would be discontinued. The reduction in cross-section has direct impacts on the stopping sight distances achieved on the link. At its lowest point, the finished road level on the link would be approximately 9m below existing ground level.

The link rises upon departure from the pinch point, passing under the York Street to York Road link (Link No. 11) carried on York Street overbridge and would rise to tie in with existing levels at North Queen Street Bridge, where widening of this bridge is required on the southern side. This would require works to demolish and replace existing retaining walls on North Queen Street. In a similar manner to the Westlink to M2 link (Link No. 1), it is proposed to construct a strengthened earthwork to minimise the extent of works on Great George's Street. The construction of this strengthened earthwork would again require the excavation of part of the existing Westlink embankment to form a suitable platform for piling operations. West of the widened North Queen Street Bridge, a lane drop is maintained to Clifton Street, with two lanes continuing southbound on Westlink.

4.2.2.3 Westlink to M3 (Link No. 3)

Link No. 3 would commence as a single lane diverge from Westlink to M2 alignment (Link No. 1) that passes under York Street overbridge in an underpass structure. At its lowest point, the finished road level in the underpass would be approximately 3m below existing ground level. To the east of York Street overbridge, the link would rise to provide 400mm cover to existing underlying pile caps of the Dargan and Lagan bridges. The link is carried over the M2 to Westlink (Link No. 2) alignment on the proposed roof slab. A lane gain from Dock Street (Link No. 6) would converge with the link, with the two resulting lanes continuing onto the existing on-ramp structure towards M3. Away from the roof slab, a new flood wall is proposed to prevent inundation of the link during an extreme flooding event.

4.2.2.2.4 **M3 to Westlink (Link No. 4)**

The link would commence on the existing Lagan Bridge off-ramp structure, with white lining used to reduce the overall number of lanes on the existing motorway off-slip to two. On approach to Dargan Bridge, a new link would be created in an offline position that passes between existing bridge piers at approximately ground level. West of Dargan Bridge, the link would drop below existing ground level in an underpass with a low point located to the east of York Street overbridge. On approach to York Street overbridge, the link would rise and is approximately 3.6m below existing ground level as it passes under the bridge. The link continues to rise to join the M2 to Westlink (Link No. 2) alignment west of York Street overbridge with a single lane gain arrangement.

4.2.2.3 **Strategic Slip Roads**

4.2.2.3.1 **Westlink to York Street (Link No. 5)**

The link would comprise a lane drop from Westlink to M2 alignment (Link No. 1), with a single lane drop opening to two lanes on approach to a new signalised junction with the York Street to York Road alignment (Link No. 11). The alignment would be initially in cutting relative to existing ground level, before rising to approximately 4.2m above existing ground level at its junction with York Street. The existing Little George's Street retaining wall would be maintained within the layout, with the extent of the existing boundary wall from house nos. 39 to 47 (odd nos.) inclusive also retained within the layout. However, on approach to York Street, the section of existing boundary wall to the north of the link would require demolition and replacement with a new retaining wall to support the raised alignment.

4.2.2.3.2 **Dock Street to M3 (Link No. 6)**

The new link would provide a direct connection from Dock Street to M3 with some horizontal and vertical realignment of the existing link required to facilitate a two-way section away from its junction with Dock Street to allow access to a future development opportunity site (Link No. 39). From this junction arrangement, a single lane would continue to form a lane gain with the Westlink to M3 link (Link No. 3), passing over the M2 to Westlink (Link No. 2) underpass via a new bridge (roof slab). A new retaining wall is proposed to support the raised alignment on its approach to the new bridge, with a new flood wall proposed to prevent inundation of the link during an extreme flood event.

4.2.2.3.3 **M3 to York Street (Link No. 7)**

The link would commence with a single lane diverge from the M3 to Westlink alignment (Link No. 4) and would be at existing ground level as it passes under Dargan Bridge at a new left-in/left-out junction with Nelson Street (South) (Link No. 12). The link subsequently would rise to meet the raised alignment of York Street (Link No. 11) and is approximately 2.3m above existing ground level at the junction between the links.

4.2.2.3.4 **Duncrue Street to Westlink (Link No. 31)**

The new link would provide a parallel merge arrangement onto the M2 to Westlink link (Link No. 2), commencing from a revised signalised junction arrangement at the M2/Duncrue Street off-slip (Links Nos. 32 and 29). In order to provide the link within the space available, it is proposed to cut into the existing M2 embankment, with the motorway supported by a new retaining wall. The finished road level on the link would be approximately 2m below the existing M2 adjacent to this retaining wall. The link would rise as it continues south, with widening of Whitla Street subway required on its eastern extent (including associated replacement of wingwalls) to accommodate the new link. Widening of the subway would have implications for a number of service corridors that are located within the existing underpass

structure, significantly a number of 110kV cables that would require substitute connections, diversion and protection for the duration of the works. It is expected that given the nature of these electrical supply cables and cooling systems, the lead-in times for these operations could be significant for the overall construction programme.

4.2.2.3.5 M2 to Duncrue Street (Link No. 32)

The existing horizontal and vertical alignment of the link would be unaffected by the proposals, however, the carriageway width of the ahead movement to Duncrue Street (Link No. 64) would be reduced on the offside with a relocated kerblin. For the left-turn to Duncrue Street from the slip road, the white lining would be revised to provide only a single lane for the movement.

4.2.2.3.6 Clifton Street On-Slip (Link No. 40)

The existing slip road, within the extents identified, would remain open and unchanged as a result of the works. Changes downstream of the merge nose would modify its merge arrangement with Westlink, with a lane gain arrangement maintained with substandard (3.25m) lane widths.

4.2.2.3.7 Clifton Street Off-Slip (Link No. 41)

The existing slip road, within the extents identified, would remain open and unchanged as a result of the works. Changes upstream of the diverge nose would modify its diverge arrangement from the Westlink, with a lane drop arrangement maintained with standard (3.65m) lane widths.

4.2.2.4 Non-Strategic Road Links

4.2.2.4.1 Dock Street (Link No. 10)

The majority of changes to Dock Street are associated with modifications to its junction with Nelson Street. At this junction the positioning of piers associated with the new Dock Street overbridge would require several traffic islands to be increased in size, therefore requiring realignment of approaches to the junction from Nelson Street (North) (Link No. 29). In addition, the introduction of a two-way section on Dock Street to M3 (Link No. 6) would also require changes to traffic islands at the junction to accommodate outbound movements.

It should also be noted that the existing Dock Street Bridge would require widening on its western side to accompany the new road layout of M2, which would create further restriction on headroom to the underlying Dock Street. Based on the current layout, headroom would reduce to a minimum of 5.3m over the carriageways, and a minimum of 5.03m over the central island and footways. It should be noted that 5.03m is the minimum maintained headroom requirement of the DMRB and so the bridge would not require signing as a “low bridge”.

4.2.2.4.2 York Street to York Road (Link No. 11)

The works would comprise a vertical and horizontal realignment of York Street to provide headroom for the new bridge structures at York Street over the proposed underpasses. The vertical realignment of the link would start on approach to the proposed junction with the M3 to York Street alignment (Link No. 7), with the link raised by approximately 1.8m at the junction, supported by new retaining walls. The link would continue to rise to a maximum of approximately 5m above existing ground level and be supported by retaining walls between bridge structures, before lowering back down to tie in with existing levels at a position adjacent to the current entrance to Cityside Retail Park (Link No. 28). A new retaining wall would be required adjacent to the retail park to support the raised alignment, with a new signalised access provided to the Cityside and Yorkgate Business Park (Link No. 27). This would require

works at street level to widen York Street on the eastern side (through narrowing of the adjacent footway) to provide the necessary central traffic island widths.

It should be noted that the proposed changes to York Street would reintroduce two-way running of a form to provide a new bus/cycle lane in the southbound direction. The southbound bus/cycle lane would be provided from the new signalised junction at the connection with the York Street to M2 on-slip (Link No. 15) and would terminate at Great Patrick Street. Provision of the southbound bus/cycle lane would require an associated reduction in the northbound lane provision, with three lanes proposed, opening to four at the junction with the M3 off-slip to York Street (Link No. 7). In addition, a northbound cycle lane of 1.5m in width would be included, with footways widened to 3m where possible within the existing building constraints.

4.2.2.4.3 Nelson Street (South) (Link No. 12)

Changes to the southern section of Nelson Street are associated with the proposed reintroduction of two-way running on the route to maintain access to existing properties. Accordingly at its junction with Great Patrick Street (Link No. 13), the existing signalised junction arrangement would be changed to provide turning facilities from Dunbar Link (Link No. 63) into Nelson Street. The cross-section of Nelson Street would be changed to accompany the proposed two-way arrangement, with a single lane provided in the northbound direction, and provision of a new left-in / left-out arrangement with the new slip road from M3 to York Street (Link No. 7). Southbound, a single lane would also be provided, opening to two lanes at the junction with Dunbar Link. The proposed junction arrangement would maintain access to properties along Nelson Street, with the reduction in carriageway width proposed to discourage through traffic towards the Shore Road or M2 using the route in lieu of the proposed route for traffic via Great Patrick Street and York Street.

4.2.2.4.4 Great Patrick Street to Dunbar Link (Link No. 13)

The existing link would be maintained in its current form, with a minor revision to route destination road markings on approach to the junction with York Street. The revision would complement changes to York Street to York Road (Link No. 11), with a reduction in the number of lanes turning right onto York Street to three, with lanes one and two to be signed for onward travel to Frederick Street (Link No. 14). At its junction with York Street, the left turn splitter island for left-turning traffic into the City Centre would be subject to minor modification to complement onward movement from the proposed bus lane on York Street to York Road (Link No. 11).

4.2.2.4.5 Frederick Street (Link No. 14)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.6 York Street (South) to M2 (Link No. 15)

The link would commence at a signalised junction with Link No. 11 with two lanes provided on a downhill gradient under Dargan Bridge, with a minimum of 400mm cover to existing bases. The link would rise to merge into the M2 foreshore at Dock Street Bridge, which would be widened to accommodate the link on its western side. The link would be supported by retaining walls on its approach to the structure. On approach to the widened bridge, the two lanes on the link would reduce to provide a single lane gain onto the M2 foreshore (Link No. 1).

4.2.2.4.7 York Street (North) to M2 (Link No. 16)

The existing provision for southbound traffic on York Street would be maintained in the new layout, with modifications as required to complement the revised horizontal and vertical layout of York Street to York Road (Link No. 11) and York Street to M2 (Link No. 15). A new signalised junction would be provided as part of the Proposed Scheme such that the movement from York Street to the M2 is signal controlled. This is considered necessary given the reduced sight distance available for traffic at the junction, and the proposed incorporation of a crossing for non-motorised users.

4.2.2.4.8 Great George's Street (Link No. 17)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.9 Little Patrick Street (East) to Nelson Street (Link No. 18)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.10 Little Patrick Street (West) to Nelson Street (Link No. 19)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.11 Little Patrick Street to York Street (Link No. 20)

Works to the existing link would comprise minor changes at street level to reflect the revised horizontal and vertical alignment of York Street to York Road (Link No. 11).

4.2.2.4.12 Little York Street (South) (Link No. 21)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.13 Little York Street (South) (Link No. 22)

The link would require horizontal and vertical realignment at its northern end to complement the alignment of the M3 to York Street link (Link No. 7) and a new access arrangement for lands remaining adjacent to Philip House.

4.2.2.4.14 Thomas Street (Link No. 26)

Works to the existing link would comprise minor changes at street level to reflect the revised horizontal and vertical alignment of Great George's Street (Link No. 17).

4.2.2.4.15 Nelson Street (North) (Link No. 29)

In order to facilitate the new Duncrue Street to Westlink (Link No. 31), the section of Nelson Street north of Dock Street junction would require realignment to accommodate a new retaining wall. At its junction with Dock Street, the link would be realigned east of its existing position, requiring landtake from the adjacent weighbridge area. North of the junction, the link would be realigned to follow its existing alignment, with existing private accesses (Link Nos. 36 and 37) maintained. The revised cross-section on the link provides for a single northbound lane for all vehicles and a single southbound lane for use by buses only. On the western side of the link, a new footway of 2m minimum width would be provided adjacent to the new retaining wall.

On approach to its termination with Duncrue Street (Link No. 64), the link would be realigned west of its current position into lands adjacent to Whitla Street fire station, to incorporate a new junction arrangement and a pedestrian crossing at the entrance to Whitla Street subway.

4.2.2.4.16 Garmoyle Street (Link No. 30)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.17 Whitla Street (Link No. 33)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.18 Dufferin Road (Link No. 34)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.19 Brougham Street (Link No. 42)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.20 Corporation Street (Link No. 43)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.21 North Queen Street (Link No. 45)

The existing layout of the link would remain unchanged by the Proposed Scheme, however, it should be noted that the widened bridge structure over North Queen Street would reduce headroom over the adjacent footway and require replacement of wingwalls on both sides of the bridge. Headroom over the carriageway would remain above a minimum of 5.03m, however, over the eastern footway headroom would reduce to approximately 4.8m. To protect the structure, it is proposed to introduce a deterrent to drivers from mounting the eastern footway such as the provision of pedestrian guardrail or bollards.

On the south-east wingwall of the bridge, it is noted that there are several memorials associated with the McGurk's Bar bombing. All such memorials would require removal as part of the works; this would be undertaken in consultation with community representatives and Transport NI.

4.2.2.4.22 Henry Street (Link No. 46)

The existing layout of the link would remain unchanged by the Proposed Scheme. At the eastern end of Henry Street, a new retaining wall is proposed to support the vertical realignment of the York Street to York Road link (Link No. 11). To facilitate this retaining wall, the existing boundary wall would be demolished. Pedestrian access from Henry Street to York Street would be maintained via a section of the existing footway adjacent to Cityside Retail Park, which would be retained and run parallel to the retaining wall.

4.2.2.4.23 Edward Street (Link No. 47)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.24 McGurk's Way (Link No. 48)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.25 Portland Place (Link No. 49)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.26 North Hill Street (Link No. 50)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.27 Southwell Street (Link No. 51)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.28 Earl Close (Link No. 52)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.29 Molyneaux Street (Link No. 53)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.30 Academy Street (Link No. 54)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.31 Great Patrick Street (North) (Link No. 59)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.32 Little George's Street (Link No. 62)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.33 Dunbar Link (Link No. 63)

The existing layout of the link would remain unchanged by the Proposed Scheme.

4.2.2.4.34 Duncrue Street (Link No. 64)

To facilitate the proposed Duncrue Street to Westlink link (Link No. 31), it is proposed to remove the large traffic island between opposing flows on Duncrue Street in conjunction with the reduction in the number of lanes on the southbound movement to two. The additional space created through these changes facilitates the new slip road, with two lanes provided in the northbound direction to the junction with the M2 off-slip (Link No. 32).

The proposed changes in horizontal and vertical alignment of the link would require further changes to the existing controlled pedestrian crossing at Whitla Street subway, with a replacement controlled crossing proposed with an additional pedestrian refuge island. At this time, an onward connection to the National Cycle Network NCN Route 93, on the eastern side of the link, has not been specifically incorporated within the scheme, however, the opportunity exists to incorporate such a crossing using the traffic island at Whitla Street.

At its junction with the M2 off-slip (Link No. 32), a revised junction arrangement is proposed to reflect changes to lane provision on the link and indeed, the off-slip from the M2. Importantly, a right-turn facility is proposed for southbound movements on Duncrue Street at the junction to facilitate onward travel to the new slip road to the Westlink (Link No. 31). The proposed junction arrangement would maintain existing movements for non-motorised users.

4.2.2.4.35 Other Existing Roads to be Abandoned and Removed

The following existing roads and streets would be abandoned and removed as part of the proposed works:

- York Link;
- Nile Street/Little York Street;
- Shipbuoy Street; and
- Trafalgar Street.

4.2.2.5 Private Accesses

4.2.2.5.1 Nelson Street Development Access (Link No. 23)

The existing access would be maintained with the Proposed Scheme.

4.2.2.5.2 Philip House Car Park (Link No. 24)

The existing access to the car park to the rear of Philip House would be revised to complement the revised alignment of the Little York Street (North) link (Link No. 20).

4.2.2.5.3 Great George's Street Car Park Access (Link No. 25)

The existing access to the car park would be relocated to Great George's Street (Link No. 17), at a position close to the junction between Great George's Street and York Street.

4.2.2.5.4 Galway House (Yorkgate Business Park) Access (Link No. 27)

The existing private access onto York Street for Galway House would be removed as part of the scheme to accommodate the new York Street to M2 link (Link No. 15). To maintain access to the current development and indeed, any future development within the overall business park, a new access is proposed at the north-west corner of the existing car park to Galway House. For safety reasons, it is proposed to signalise the access in conjunction with a revised access arrangement for Cityside Retail Park (Link No. 28) in accordance with Transport NI policy.

4.2.2.5.5 Cityside Retail Park Access (Link No. 28)

The existing left-in / left-out access arrangement for Cityside Retail Park cannot be retained within the scheme, owing to its proximity to the relocated access for Galway House. Accordingly, the scheme would provide a new signalised access for Cityside Retail Park which would, in turn, require accommodation works to relocate signage and modify internal car parking arrangements within the site.

4.2.2.5.6 Weighbridge Access from Dock Street (Link No. 35)

The existing access to the weighbridge facility from Dock Street would be retained within the scheme, with modification as required in line with other proposed changes to the signalised junction between Dock Street and Nelson Street. It should be noted that the revised junction arrangement would maintain the existing uncontrolled pedestrian crossing across the entrance.

4.2.2.5.7 Weighbridge Access from Nelson Street (Link No. 36)

The existing access to the weighbridge facility to Nelson Street would be retained within the scheme, with modification as required in line with other proposed changes to Nelson Street (North) (Link No. 29).

4.2.2.5.8 Trow Nutrition Nelson Street Access (Link No. 37)

The existing access would be retained within the scheme, with modification as required in line with other proposed changes to Nelson Street (North) (Link No. 29).

4.2.2.5.9 Pumping Station Access Road (Link No. 38)

All proposed underpasses within the scheme would drain to a single wet well at a location near to the low point of the M2 to Westlink (Link No. 2) alignment. A pumping station facility would be constructed to discharge stormwater from the wet well and requires a suitable access road. Given the location of the pumping station, it is proposed to provide a new access road within the site of the Corporation Street Car Park, which would be closed as part of the proposals to ensure access to the facility is available on a 24/7 basis, for both planned and emergency maintenance. The access road would therefore utilise the existing access to Corporation Street underneath Lagan Bridge, with a new road alignment around its existing piers. A single passing point is proposed on the access road, with the carriageway of the road sized to facilitate the swept path of a 75-tonne mobile crane; the largest crane anticipated to require access to the site for maintenance purposes. Sufficient headroom exists to the existing Lagan and Dargan bridges to accommodate such a vehicle in its transport position. A large turning head facility would be incorporated to provide for associated turning movements and to provide a suitable area for craning operations as necessary.

4.2.2.5.10 Nelson Street Access Road (Link No. 39)

Lands located between the M2 to Westlink link (Link No. 2) and the Dock Street to M3 link (Link No. 6) have been identified as having potential opportunities for development, if disposed of by the Department following completion of the scheme. To maximise the potential of the land, access has been enhanced through the proposed introduction of a short section of two-way running from the junction with Dock Street. The proposed two-way section would terminate at a new access arrangement to the land, with a priority junction proposed.

4.2.2.5.11 Trow Nutrition Garmoyle Street Access (Link No. 44)

The existing access would be maintained within the Proposed Scheme without modification.

4.2.2.5.12 Magnet House Car Park Access (Link No. 55)

The existing access would be maintained within the Proposed Scheme without modification.

4.2.2.5.13 Great Patrick Street Private Car Park Access (Link No. 56)

The existing access would be maintained within the Proposed Scheme without modification.

4.2.2.5.14 T&T Clothing Co. Access (Link No. 57)

The existing access would be maintained within the Proposed Scheme without modification.

4.2.2.5.15 CPA Access No. 1 (Link No. 58)

The existing access would be maintained within the Proposed Scheme without modification.

4.2.2.5.16 Pollock Road Entrance to Harbour Estate (Link No. 60)

The existing access would be maintained within the Proposed Scheme without modification.

4.2.2.5.17 **Weighbridge access from Garmoyle Street (Link No. 61)**

The existing access would be maintained within the Proposed Scheme without modification.

4.2.3 **Structures**

4.2.3.1 **Overview**

The scheme would require the construction of several significant structures, summarised below:

- four major underpasses, with retained heights of up to circa 10m;
- two twin-span pre-stressed beam bridges, one highly skewed;
- a single span bridge supported on the walls of the largest underpass;
- a three-span bridge carrying traffic over the Dock Street junction;
- two existing bridges to be widened, with parapet improvements, one adjacent to an existing raised railway structure;
- several retaining walls, several subject to collision loading and/or acting as flood protection walls;
- an extension to a pedestrian underpass;
- several services culverts;
- three overhead sign/signal gantries;
- structures associated with pumping stations required for scheme drainage;
- strengthening works to the foundations of Lagan Road Bridge; and
- strengthening works to the foundations of Dargan Rail Bridge.

Potential design options were identified for each of the structures, each option being defined by the following basic features:

- structural form;
- type of foundation;
- span arrangements;
- articulation; and
- choice of materials.

In most cases, several technical solutions presented themselves, in which case the choice of the preferred solution was influenced by the following factors. In no specific order:

- disruption to the road network during construction;
- appearance and environmental impact;

- desire to maintain the appearance of a “family” of structures within the scheme;
- safety and ease of construction;
- foundation conditions;
- road geometry;
- future maintenance; and
- capital and whole life cost.

The preferred solution for each structure was developed and is presented in the drawings included for each structure in the Stage 3 Scheme Assessment Report (Part 2).

All new works would be designed to Eurocodes, with their associated National Annexes and Published Documents. Existing structures would be assessed either qualitatively, in accordance with BA 16 of the DMRB, or quantitatively in accordance with BD 21 and BD 44 of the DMRB. Wherever it can be demonstrated that loads applied to the existing structure have not increased, a qualitative assessment would be considered adequate. If loading applied to an existing structure is increased, a quantitative assessment would be undertaken.

A major consideration in the Stage 3 design development has been the requirement to minimise disruption to the road network during construction. Buildability and any temporary traffic management requirements have been considered in detail.

Another challenge associated with the project is the poor ground conditions. This means that the majority of structures require piling. This in itself makes limiting the disruption to existing roads more challenging, due to the logistics of installing piles. Many of the structures on the scheme are reinforced concrete retaining walls. Time may be saved constructing these walls if precast retaining walls were used. However, as the ground conditions on the scheme generally necessitate piled foundations, there is a challenge associated with the interface between standard precast cantilever retaining walls and piles. Options, such as the use of precast stem and cope units only, the use of in-situ piled support slabs for precast concrete retaining wall units, and the use of pocketed precast units with in-situ stitch connections are available. The final preferred solution would be dependent on the appointed contractor’s preference and economic considerations. For the same reason, the structures drawings presented with the Stage 3 Scheme Assessment Report (Part 2) do not specify either in-situ or precast forms of construction.

Interfaces with existing bridge foundations for the Lagan and Dargan bridges form a constraint to both the road alignment and to the structural form of adjacent new works. In addition to strengthening works for certain foundations for the existing Lagan Bridge, which is detailed below, the final vertical road alignment would have to allow sufficient clearance over existing foundations to ensure new embankment support structures and flood protection measures can be installed. In turn, the structural and geotechnical design of such structures and measures would have to take account of the location of the existing foundations. Stage 3 proposals have been developed to a stage where these detailed design criteria should be met.

The design adopted for each of the structures is discussed briefly in the following sections and should be read in conjunction with Figure 4.2.

4.2.3.2 *Description of Structures*

4.2.3.2.1 *BR-001 – North Queen Street Bridge Extension*

The existing North Queen Street Bridge carries the Westlink alignment over North Queen Street. It is a single span pre-stressed beam bridge with in-situ concrete deck. The proposed Westlink cross-section is wider than the existing bridge, requiring it to be extended northwards and southwards by approximately 4 metres and 2.5 metres respectively. It is envisaged that the extensions shall be formed from reinforced concrete abutments dowelled into the existing abutments, with pre-stressed beams and an in-situ deck to match the existing structure. As settlement has already occurred beneath the existing bridge foundations, piled foundations are proposed beneath the extensions to prevent differential settlement.

The existing Westlink alignment needs to be retained during construction of the extensions and it is envisaged that this would be achieved using sheet-piling. The extent of disruption to the Westlink depends on whether piling platforms can be formed to allow piling rigs to work from the side of the Westlink, rather than directly on it. Formation of these platforms would require disruption to the roads and pedestrian routes below the Westlink (North Queen Street, Great George's Street and the stairs and footpath area north-west of the bridge). The existing police station wall may facilitate forming a piling platform at the south-west corner of the bridge, potentially providing support to the southern extent of the piling platform. At the north-east corner of the bridge, a sheet pile wall would need to be installed from the Westlink, to allow extension of the bridge abutment. It is envisaged that this would be undertaken after the bridge has been extended southwards, to increase the space for re-configuration of lanes over the bridge.

Disruption to Great George's Street and North Queen Street would also occur during installation of permanent piles for the extensions to the existing wingwalls, including the replacement of a 10m section of the existing Great George's Street retaining wall adjacent to the widened bridge structure.

4.2.3.2.2 *BR-002A – York Street Overbridge (South)*

Bridge BR-002A would carry York Street (Link No. 11) over underpasses UP-001A and UP-001B. It would be integral with the diaphragm walls used to form the underpasses.

The bridge would have a skew of 21 degrees with a total skewed length of approximately 34m. It would have two spans, each formed from pre-stressed concrete beams with a reinforced concrete deck slab.

At the internal support, the diaphragm wall would be continued up to existing ground level. This would be attractive from a construction perspective because it would allow the underpasses UP-001A and UP-001B to be constructed separately. Above existing ground level, discrete columns would be provided. This gives the structure a more open appearance, which is desirable from a driver comfort perspective. The columns would be formed from 20 equal facets to improve their aesthetics. The aesthetics could be further improved by breaking down the central diaphragm wall after the underpasses were formed. Full height columns could then be constructed, which would open the structure up further, although there would clearly be cost implications associated with this. This would also result in a very tall retaining wall east of the bridge. Currently, it is assumed that the central diaphragm wall would not be broken down. The cross head at the column tops would not protrude below the soffit of the beams and would be integral. This is preferable to downstands below the beam soffits from an aesthetics perspective.

The upper part of the abutments and the deck are above ground level. They would be formed after the underpass has been excavated and temporary props have been removed. This

prevents the deck from acting as a prop in the short-term (although in the long-term, creep effects would result in a degree of propping action).

Disruption associated with the construction of this bridge would be modest, and likely to coincide with closures required for the construction of underpass UP-001A.

4.2.3.2.3 BR-002B– York Street Overbridge (North)

Bridge BR-002B would carry York Street (Link No. 11) over underpasses UP-002A and UP-002B. It would be supported on the diaphragm walls used to form the underpasses.

Bridge BR-002B would have two spans, which are formed from pre-stressed concrete beams with a reinforced concrete deck slab. It would have a skew of approximately 45 degrees with a total skewed length of approximately 50m. To minimise the construction depth, the beams would be placed at closer than normal spacing, and higher grade concrete would be used. The beams would be sized to be the same as BR-002A, which would have a significantly shorter span. This would retain a constant beam depth when both bridges are viewed from the Westlink.

At the internal support, the diaphragm walls are continued up to existing ground level. This is attractive from a construction perspective because it allows underpasses UP-002A and UP-002B to be constructed separately. Above existing ground level, discrete columns would be provided. This gives the structure a more open feel, which is desirable from a driver comfort perspective. The columns would be formed from 20 equal facets to improve their aesthetics. The aesthetics could be further improved by breaking down the central diaphragm wall after the underpasses were formed. Full height columns could then be constructed, which would open the structure up further, although there would clearly be cost implications associated with this. This would also result in a very tall retaining wall east of the bridge. Currently, it is assumed that the central diaphragm walls would not be broken down. The cross head at the column tops would not protrude below the soffit of the beams and would be integral. This is preferable to downstands below the beam soffits from an aesthetics perspective.

Disruption associated with the construction of this bridge would be modest, and likely to coincide with closures required for the construction of underpass UP-001A.

4.2.3.2.4 BR-003 – Underpass UP-001A Roof Slab

Bridge BR-003 would carry the Westlink to M3 (Link No. 3) and Dock Street to M3 (Link No. 6) interchange links over underpass UP-001A. It is supported on the diaphragm walls which form the underpass UP-001A.

BR-003 would be a single span portal structure which is integral with the diaphragm/bored pile walls of the underpass. It would have a span of 13m and the deck is formed from in-situ reinforced concrete. The bridge is approximately 55m wide, extending beyond the width required to support the link roads. This additional width is required to prop the underpass walls over the extent of the underpass coinciding with the foundations of the existing Dargan and Lagan bridges. The additional width also safeguards against dropped items from the Dargan or Lagan bridges landing in the underpass.

4.2.3.2.5 BR-004 Dock Street Overbridge

Bridge BR-004 would carry the M2 to Westlink (Link No.2) over the Dock Street junction.

Bridge BR-004 would have 3 spans and is formed from pre-stressed concrete beams with a reinforced concrete deck slab. It would have a skew of approximately 20 degrees, with a total skewed length of approximately 80m.

At the internal supports, full height columns would be provided. These would be integral with the deck, minimising maintenance requirements at these locations, in the midst of a busy junction. The columns would be 1.5m diameter and would be formed from 20 equal facets to improve their aesthetics and discourage graffiti. The location of the columns is determined by the traffic islands below.

4.2.3.2.6 Bridge BR-005 - Dock Street Bridge Extension

The existing Dock Street Bridge carries the M2 northbound and M2 southbound over Dock Street. It is a four span bridge, with a pre-stressed beam deck supported on bankseats at each end, with columns for internal supports. The original bridge was extended westward in the 1990's.

The proposed re-alignment of the M2 southbound would require the bridge to be extended further westwards. This would be achieved by extending the already once extended abutments and internal supports, removing the existing cope, and extending the existing pre-stressed beam deck by approximately 6.3 metres, with similar beams. There would be significant disruption to Dock Street during this construction work, with some disruption to the M2 also. A single night-time, complete closure of Dock Street would be required for erection of the pre-stressed beams. Aside from this complete closure, careful phasing of the works, sheet piling and traffic management (including contraflows) may be used to ensure a minimum of one lane shall remain open in each direction at all other times.

4.2.3.2.7 Bridge BR-006 – Whitla Street Subway Extension

Currently the Whitla Street subway passes beneath the M2, providing pedestrian access between York Street, Nelson Street and Whitla Street. The proposed re-alignment of the M2 results in it widening at this location, requiring the subway to be extended. The subway also carries numerous services, including water, gas and electricity, buried between dividing walls, beneath the footpath of the subway.

It is proposed that the extension be made by continuing the piled reinforced concrete box structural form of the existing structure. Dowels shall be used to ensure a structural connection between the existing and new structures.

Disruption to the M2 during construction shall be minimised by sheet piling along the edge of the current M2 alignment, from a piling platform formed adjacent to Nelson Street using gabions or similar temporary works. Once the sheet piling is established, the existing retaining walls would need to be removed before constructing the new works.

4.2.3.2.8 Retaining Wall RW-001

Retaining wall RW-001 provides retention to the soil supporting the north side of the proposed widening of the Westlink as it approaches North Queen Street Bridge (BR-001) from the west. The wall reaches approximately 5.6 metres in height and is approximately 85 metres long.

Over the majority of its length, where it is sufficiently removed from the existing Westlink retaining walls, the proposed wall would be a standard piled reinforced concrete cantilevered retaining wall. Wherever the new wall approaches the existing wall, sheet piling would be required to prevent undermining of the existing wall. This would require the formation of a piling platform and closures to the pedestrian footpath at this location. Towards the east end of the wall, where it interfaces with bridge BR-001, the base geometry would be reversed so that its toe is larger than its heel. This allows the wall to be constructed without demolishing the existing wall. Sheet piling would be required at this location to avoid undermining the existing retaining wall.

It is likely that the existing retaining walls would require demolition down to a level sufficient to allow the new Westlink alignment to pass over them without formation of hard-spots.

4.2.3.2.9 Retaining Wall RW-002

Retaining wall RW-002 comprises the south-west wingwall to North Queen Street Bridge (BR-001).

4.2.3.2.10 Retaining Wall RW-004

Retaining wall RW-004 has two functions. Firstly it acts as an earth retaining wall, allowing for the differences in levels between diverging underpasses UP-001A and UP-002B; secondly, it acts as a continuation of the concrete safety barrier VCSB-001 as it approaches the divergence.

The proposed wall is a reinforced concrete piled retaining wall, designed to resist collision loading. It would be approximately 40 metres long and up to 2 metres high.

4.2.3.2.11 Retaining Wall RW-007

Retaining wall RW-007 would retain the west side of the proposed York Street (Link No. 11) road alignment and part of the Westlink to York Street (Link No. 5). The wall would start from the end of the existing brick boundary wall to the rear of nos. 39-47 (odds) inclusive of Little George's Street. It then runs parallel to the York Street (Link No. 11) alignment to a location near the revised access arrangement to Cityside Retail Park (Link No. 28).

The wall would be a reinforced concrete cantilever retaining wall with piled foundations. It would have a retained height of up to 5.1 metres, with an approximate length of 145 metres.

4.2.3.2.12 Retaining Wall RW-017

Retaining wall RW-017 would retain the east side of the embankment carrying the link road between the M2 and Westlink (Link No. 2) on its southern departure from Dock Street Bridge (BR-004). Earthworks could have been used to reduce the height of the wall, but the full height walls were selected to maximise the level ground available at finished ground level for future development.

RW-017 would be a reinforced concrete cantilevered retaining wall on piled foundations. It would reach a height of 8.4m, over a length of 117 metres. The wall is bound at its northern end by Dock Street Bridge (BR-004) and at its southern end by Underpass UP-001A. At the interface between RW-017 and UP-001A, the wall is detailed to provide flood water retention up to 3.9m AOD. This would prevent water from entering the underpass in the event of a 1-in-200 year coastal flood event. Ground strengthening would be required beneath the embankment behind the retaining wall.

4.2.3.2.13 Retaining Wall RW-018

Retaining wall RW-018 would retain the west side of the embankment carrying the link road between the M2 and Westlink (Link No. 2) on its southern departure from Dock Street Bridge (BR-004). Earthworks could have been used to reduce the height of the wall, but the full height walls were selected to maximise the level ground available at finished ground level for future development.

RW-018 would be a reinforced concrete cantilevered retaining wall on piled foundations. It would reach a height of 8.2m, over a length of 105 metres. The wall is bound at its northern end by Dock Street Bridge (BR-004) and at its southern end by Underpass UP-001A. At the

interface between RW-018 and UP-001A, the wall is detailed to provide flood water retention up to 3.9mAOD. This would prevent water from entering the underpass in the event of extreme flooding. Ground strengthening would be required beneath the embankment behind the retaining wall.

4.2.3.2.14 Retaining Wall RW-020

RW-020 has two functions. Firstly it provides earth retention to accommodate the difference in level between two neighbouring roads:

- the eastbound link between the Westlink and the M2 heading north; and
- the link between the northbound York Street and the M2 heading north.

Secondly, RW-020 also acts as a safety barrier between the two roads.

The wall would be a reinforced concrete cantilever retaining wall, on piled foundations. It would be approximately 155 metres long with a maximum height of approximately 4.5 metres.

4.2.3.2.15 Retaining Wall RW-021

RW-021 would provide retention to the proposed York Street (South) to M2 slip road (Link No. 15). It would be a reinforced concrete cantilevered retaining wall on piled foundations. It interfaces with Dock Street Bridge extension (BR-005) at its northern end. The wall would be approximately 130 metres long, typically 2-3 metres high, but rising to 6 metres where it ties into Bridge BR-005.

There is sufficient space to construct the wall with minimal disruption to the M2, apart from where it interfaces with Dock Street Bridge extension (BR-005). At this bridge (BR-005), sheet piling would be required to form the extension to the abutments. A minor extension to the sheet pile wall would provide sufficient retention for the construction of retaining wall RW-021.

4.2.3.2.16 Retaining Wall RW-022

RW-022 would retain the proposed embankment supporting the M2 to Westlink and Duncrue Street to Westlink alignments (Link Nos. 2 and 31 respectively). It is adjacent to Nelson Street and passes beneath the northern span of Dock Street Bridge (BR-004), adjacent to the north abutment of the bridge.

RW-022 would be a reinforced concrete cantilever retaining wall on piled foundations. It would approach 8.5 metres in height and be approximately 185 metres long. At the southern end of RW-022, it would curve beneath Dock Street Bridge (BR-004), in front of its northern abutment.

At the northern end of RW-022, the wall would interface with underpass BR-006 and be aligned close to the existing M2 motorway. To form the northern end of the wall would require a hard shoulder closure on the M2.

Disruption to the existing Nelson Street during construction would be minimised by sheet piling as close as possible to the toe of the wall, without hampering construction, but there would be a reduction in available carriageway width.

4.2.3.2.17 Retaining Wall RW-024

RW-024 would retain the M2 (Link No. 2) and Duncrue Street to Westlink (Link No.31) alignments at the northern extent of the scheme. It would require approximately 100 metres of piled reinforced concrete cantilever retaining wall, with a retained height of up to 2.8 metres.

Sheet piling would be required, coupled with a hard shoulder closure on the M2, to allow construction of the wall while minimising disruption to the M2. This would require a piling platform, but there is sufficient space between the M2 and Duncrue Street for this to be achieved without disruption to Duncrue Street.

4.2.3.2.18 Retaining Wall RW-025

RW-025 has two functions. It would act as a flood wall, preventing coastal flooding from entering the underpasses, and it also provides parapet edge protection to the proposed Dock Street to M3 alignment (Link No. 6). It would be a reinforced concrete cantilever retaining wall formed on piled foundations. It would be constructed during a closure of Nelson Street, associated with its re-alignment, so there are no unusual construction challenges. The wall would reach a height of 5.1m, with a total length of 84.5 metres.

Where the stem of the wall extends above 3.9m AOD, a metal parapet is proposed, to reduce collision loading. However, where the wall acts as a water retaining structure, clearly a solid reinforced concrete flood wall is required, and this doubles as a reinforced concrete parapet, resisting collision loading.

4.2.3.2.19 Retaining Wall RW-026

RW-026 would be located just south of Bridge BR-003 (carrying Westlink to M3, and Dock Street to M3) and would act as a flood wall, preventing coastal flooding entering the underpasses from its eastern side. It is a reinforced concrete cantilevered wall on piled foundations.

The construction of this wall would require a single lane closure to the existing M3 on-slip, with sheet piles used to minimise the size of the closure. Sheet piling would also be required to ensure works remain within the limit of land made available.

4.2.3.2.20 Retaining Wall RW-027

Retaining wall RW-027 would mirror retaining wall RW-026, providing flood protection to the western side of the M3 on-slip, just south of Bridge BR-003.

The wall would be a reinforced concrete cantilevered retaining wall on piled foundations. The use of sheet piling during construction of this retaining wall would remove the need for closures to the Nelson Street to M3 southbound slip road.

4.2.3.2.21 Retaining Wall RW-028

RW-028 would retain the proposed raised York Street (Link No. 11) and border the existing car park, which is to be retained. The wall would reach a maximum height of approximately 2 metres, with a length of approximately 66 metres.

Where the walls would have significant soil retention, they would be formed from reinforced concrete cantilevered retaining walls on piled foundations, with brick facings and a pedestrian guardrail mounted on top of the wall.

Due to the limited retained height relative to existing road levels, the walls could be constructed without lane occupations either to York Street or Great George's Street, provided this is done before the road alignment is raised. Once the road alignment has been raised, they would clearly be retaining significantly more.

4.2.3.2.22 Retaining Wall RW-029

RW-029 would retain the proposed embankment supporting the M2 to Westlink (Link No. 2), north of Whitla Street Subway Extension (BR-006), adjacent to Nelson Street.

RW-029 would be a reinforced concrete cantilever retaining wall on piled foundations. It would approach 6 metres in height and is approximately 80 metres long. At the southern end of RW-029, it would interface with underpass BR-006.

Construction of this wall would require occupations of the M2 and Nelson Street to allow installation of sheet piles, which are required to minimise disruption to traffic during construction.

4.2.3.2.23 Retaining Wall RW-030

RW-030 is a proposed flood wall located to the nearside of York Street (South) to M2 (Link No. 15) to prevent coastal flooding from entering underpass UP-001A. The wall would be of modest height given projected flood levels at the location and so is anticipated to be a reinforced concrete cantilevered wall with a piled foundation, similar to RW-026.

4.2.3.2.24 Retaining Walls RW-031 to RW-034

Retaining walls RW-031 to RW-034 inclusive are proposed to limit the extents of proposed ground improvements at York Street. The walls would be of similar form to adjacent retaining walls and therefore are anticipated to be formed by reinforced concrete cantilevered walls on piled foundations.

4.2.3.2.25 Services Culvert CU-001

This services culvert would provide the main route for services to pass beneath the M3 on-slip from Nelson Street and the Westlink. It would carry significant, gas, electric and telecommunications services.

Despite its simple structural form, this structure is possibly the most challenging in terms of construction, due to implications for the road network.

The structure would be formed from three reinforced concrete boxes, formed from lightweight aggregate concrete, to facilitate lifting of the structures. The three boxes would be placed side-by-side, with access manholes at both ends. Sumps would be provided at the lower ends of the boxes to facilitate pumping out in the event of flooding.

In summary, the foundations would be off-line, and with the use of temporary works, could be constructed without disruption to the roads network. The boxes would also be constructed off-line at a suitable location for a high capacity mobile crane to lift them into position. There would be sufficient space for construction of the boxes, and a high capacity mobile crane, north-east of the final location of the culvert. During the first night closure, the existing road would be excavated with heavy plant. The three boxes would be lifted into position before temporary backfilling and re-instatement of the road surface. On the following night, another closure would be required to properly compact the backfill around the culverts and permanently reinstate the road surfacing.

4.2.3.2.26 Services Culvert CU-002

In a similar manner to Culvert CU-001, an additional service corridor crossing is required at the M3 off-slip. It is proposed that the form of this crossing would take the form of one or several new culverts of a similar form and construction to CU-001.

4.2.3.2.27 Services Culverts CU-003 and CU-004

Several services require diversion from York Street as part of the proposed works, to avoid the new diaphragm walls installed as part of the various underpasses. Given the number, complexity and lead-in times of such service diversions, it is proposed to undertake these service diversions at the onset of the contract, or potentially, as part of an advance works contract. As the contractor would then be required to construct the various ground improvements around the diverted services, there is a risk of accidental damage. Given the importance of the services to the surrounding areas, it is considered that this is not a risk that the service providers would be willing to accept unless a more pro-active form of protection is in place. Accordingly, it is proposed to construct a number of additional service culverts (CU-003 and CU-004) through which the diverted services would be routed, providing a more substantial form of protection. It is envisaged that these culverts would be of reinforced concrete construction, with precast sections expected to be promoted by the contractor to speed construction. The culverts would be constructed below existing ground level and are not anticipated to require their own piled foundations, subject to confirmation at detailed design stage. The culverts would then be covered by reinforced concrete slabs as part of the proposed ground improvements works.

4.2.3.2.28 Variable Concrete Step Barrier VCSB-001

A variable (height) concrete safety barrier (VCSB) would be provided in the central reserve of the Westlink, west of retaining wall RW-004, extending to the most westerly extent of the scheme, west of North Queen Street Bridge (BR-001). The purpose of the structure is to prevent errant vehicles from crossing the central reserve, and also to accommodate very modest differences in road levels either side of the VCSB. It would replace the existing safety barrier which would not be compliant with modern codes.

These structures are formed directly on top of road make-up by specialist contractors. Constructing the VCSB would require lane occupations to the Westlink in both directions.

4.2.3.2.29 Underpasses UP-001A, UP-001B, UP-002A and UP-002B

The link from the M2 to Westlink (Link No. 2) would be initially elevated over modified and new roads (Link Nos. 6, 10 & 29) before dropping in to a depressed section below existing ground level that passes under a combination of existing and new roads and structures (existing Lagan and Dargan bridge structures, and Link Nos. 3, 6 & 11). This depressed section would be contained within Underpass UP-001A.

The link from the M3 to Westlink (Link No. 4) would be depressed below existing ground level and passes under a combination of existing and new roads and structures (existing Dargan Bridge structure and Link No. 11) and would be contained within Underpass UP-001B.

Underpass structures UP-001A and UP-001B would meet at a position adjacent to the west of proposed York Street Bridge (BR-002A).

The link from the Westlink to M2 (Link No. 1) would be depressed below existing ground level and passes under a combination of existing and new roads and structures (existing Dargan Bridge structure and Link No. 11) before rising to meet the existing elevated section at Dock Street (Link No. 10). The depressed section would be contained within Underpass UP-002A.

The link from the Westlink to M3 (Link No. 3) would be depressed below existing ground level and passes under the new York Street (Link No. 11) before rising back to existing ground level and passing under the existing Lagan and Dargan bridge structures and over new underpass UP-001A (Link No. 2). The depressed section would be contained within Underpass UP-002B.

Underpass structures UP-002A and UP-002B would meet at a position adjacent to the west of proposed York Street Bridge (BR-002A).

Underpass structures UP-001A, UP-001B, UP-002A and UP-002B would finally all meet and merge into Link No. 1 and Link No. 2, as appropriate, before crossing over North Queen Street (Link No. 45) and prior to entering the Westlink.

Owing to the constraints on cross-section and headroom, it is proposed to use diaphragm walling, constructed using specialist low-headroom plant, to construct the part of UP-001A that would pass underneath and immediately adjacent to the existing Lagan and Dargan bridges.

Away from this identified pinch point, it is proposed to continue with the use of diaphragm walling to form the remaining underpass retaining elements. Accordingly, the proposed structural form for all underpasses is that of diaphragm walls supported by a low level propping slab with an inner wall lining formed from GRC cladding panels or equivalent. The use of an inner lining would accommodate the appropriate tolerances on the diaphragm wall verticality, whilst providing a more aesthetically pleasing finish to be provided through the underpasses. The first 1.5m of the lining above finished road level would require to be plain finished in-situ concrete upstand walls to comply with vehicular impact requirements of the DMRB. These concrete sections would be extended from the lower propping slab level forming, in effect, a shallow trough section.

To ensure acceptable water-tightness of the final underpass structures, the performance requirements of the embedded retaining wall systems will have to be carefully specified in the construction contract and particular care will be required during final design and construction to meet such requirements. It is recommended that the embedded retaining wall elements are constructed in accordance with the latest versions of the ICE Specification for piling and embedded retaining walls, BS 8007 Code of practice for the design of concrete structures for retaining aqueous liquids and BS 8102 Code of practice for protection of below ground structures against water from the ground.

It is not expected that there would be any significant seepage of groundwater through the retaining elements. Therefore, within the extents of the underpasses, it is not expected that there would be a requirement to collect and dispose of significant quantities of groundwater. The internal drainage system would be designed to cope with any small volumes of groundwater that may seep into the system over time, which would discharge into the main pumping station arrangement.

A single pumping station is proposed to cater for storm water run-off from all four underpasses. Underpasses UP-002A, UP-002B and UP-001B would drain by gravity into a single wet well adjoining underpass UP-001A. This would require several crossings through the diaphragm walls by carrier drains, which require routes above the base slab within the watertight section of the underpass. To restrict the risk of leaks occurring at these penetrations of the diaphragm wall system, these crossings would all occur at bespoke connection chambers which would allow access to puddle flange connections, etc. which would otherwise be buried. Accordingly, the formation level of the base slab has been lowered to ensure that all road drainage is carried within the inner frame of the underpass, to provide a sealed drainage system.

To assist the phased construction of the various underpasses, cross walls are proposed at a number of locations. These walls will serve both to assist the phasing of construction works and to help provide a watertight 'bathtub' section formed from the diaphragm walls, with the internal cross walls adding redundancy against any groundwater leakage that could possibly occur over time through the founding materials.

In order to protect the underpasses from coastal flooding, the above ground 'stems' of the retaining walls would be extended to a minimum level of 3.9m AOD. To prevent flood water entering from the ends of any of the underpass sections, the shallow trough formed by the base slab and associated upstand walls should be continued beyond the underpass sections to beyond this level. Alternatively, a robust alternate water-resisting system may be proposed by the successful contractor.

An option that may also be considered to remediate environmental impacts of vehicular traffic within the depressed underpass sections is the use of a photocatalytic material in the form of e-GRC or similar in the facing panels.

4.2.3.2.30 *Lagan Bridge Foundation Strengthening FS-001*

Bearing in mind the importance of the Lagan Bridge, it is strongly recommended to remove the risk of the structural integrity of its foundations being compromised. This can be achieved by strengthening the Lagan Bridge foundations such that they remain code compliant in the event of the rows of piles closest to the diaphragm walls being rendered ineffective.

The proposed strengthening works comprise barrettes, or mini-piles, offset from the existing foundation piles, and the proposed underpass diaphragm walls. These would be joined by an inverted reinforced concrete u-frame which partially encapsulates the existing foundation slab.

A challenge associated with the strengthening works is that the proposed road alignment is not far above the existing foundations. As there is a requirement for the strengthening works to act as a u-frame above the existing pile cap, it is likely that there would be only 120mm of surfacing on top of the pile cap. This could present a hard spot in the new road alignment. To prevent this, run-on slab type geometry is proposed, combined with a slab spanning between the strengthening works and the underpass walls.

Clearly the strengthening works are required to be in place before construction of the sections of diaphragm walls close to the existing foundations. It is proposed that the strengthening works are undertaken either as an advanced works package or during an initial phase of the temporary traffic management plan, prior to the section of underpass wall close to the existing foundations being formed.

4.2.3.2.31 *Dargan Bridge Foundation Strengthening*

The proposed dualling of the Dargan Bridge, to provide a section of twin-track between Dock Street and Donegall Quay, has been identified as a long-term potential improvement scheme to the rail network in the BMTP.

It was recognised that the road alignments within the Proposed Scheme are constrained by the dimensions of the existing bridge foundations, including those of the Dargan Bridge. Any proposal to increase the loading on the Dargan Bridge through the provision of a dualled section would increase the loadings transferred to the underlying strata through its piled foundations. Depending on the changes to the bridge superstructure, the additional loading may require the strengthening of the existing Dargan Bridge foundations. Such strengthening would most likely be in the form of the provision of additional piling and an increase in the dimensions of the associated bases. Accordingly, the project team has consulted with

Translink to discuss the Proposed Scheme and minimise any impact on overlying road alignments.

Based on consultations thus far, it would appear that the proposal to dual the Dargan Bridge is not presently a high priority scheme on the Translink investment programme, with proposals at conceptual design stage and certainly not as advanced as those of the Proposed Scheme. However, Translink has recognised that construction of the Proposed Scheme presents an invaluable opportunity to undertake any works to strengthen the existing Dargan Bridge foundations as a minimum, to minimise the overall impacts on road users in the long-term.

In order to future-proof Dargan Bridge for possible future widening to accommodate two tracks over its full length, it is proposed that strengthening works to some 16 of its foundations are undertaken under the York Street Interchange Works Contract. Much of these strengthening works would be extremely difficult, if not impossible, to undertake after the York Street Interchange works were complete without unacceptable disruption to road traffic.

Specifically, the strengthening works would comprise additional piling and extension of existing pilecaps and some strengthening of the existing pier heads. The pilecap works are likely to be covered over when the works are completed, although there is the possibility that some small visible plinths may be created around the stems of the piers; the precise details would not be determined until detailed designs are undertaken. It is hoped that strengthening works to the piers heads would be limited to carbon fibre wrapping of the existing reinforced concrete to a depth of approximately 1.5m below the bearing shelf level. The carbon fibre wrapping is typically black in colour but, if desired, could be painted for aesthetic purposes.

Following further discussions between Translink and Transport NI, it has been agreed that the development of the Proposed Scheme is to proceed on the understanding that the works to the Dargan Bridge foundations, as a minimum, are to be incorporated into the future construction contract. It must however be stressed that any proposed works by Translink, although potentially accommodated by Transport NI within its construction contract, must remain subject to the satisfactory outcome of separate economic appraisal, statutory procedures and the availability of funding.

4.2.3.2.32 Gantry GY-001

A signal gantry is proposed on the Westlink approach to the scheme to provide advance directional signage and motorway control equipment for road users. A location has been identified for a new signal gantry (access type) to the west of North Queen Street Bridge (BR-001). The gantry would be accessed via a single maintenance layby on the M2 bound carriageway. The proposed gantry would take the form of a single span truss, similar to existing counterparts on the motorway network, with a clear span of 34m between supports.

4.2.3.2.33 Gantry GY-002

A sign gantry is proposed to the south of the York Street Bridge (BR-002) to facilitate advance directional signage for road users. No additional electronic signage is required at the location and accordingly, an access-type gantry is not proposed. The form of the structure could be one of several options, with a proposed clear span of 29.5m between supports.

4.2.3.2.34 Gantry GY-003

The existing access-type gantry at this location would require removal to accommodate the proposed road layout. To reinstate advance direction signage and motorway control equipment, a replacement structure is proposed. To minimise the works required and hence disruption to road users on the M2 motorway, it is proposed to retain the existing support plinth in the M2 central reserve and provide a structure with a larger span, to a new support

arrangement on the nearside verge of the York Street to M2 link (Link No. 15). The replacement structure would be of a similar form to the existing structure and would have a clear span of 33m between supports. The structure would be accessed directly from the hard shoulder on the slip road from York Street.

4.2.3.2.35 Gantry GY-004

Gantry GY-004 is an existing signal gantry on the M2 foreshore. To complement the proposed road layout, it would be necessary to alter advance direction signage on the gantry. Such works would present an opportunity for Transport NI to replace the older matrix motorway indicator electronic signs on the gantry, in addition to associated corrugated metal fascias as part of separate proposals to extend the managed motorway system to the M2 and M3 in the longer term.

4.2.3.2.36 Gantry GY-005

Gantry GY-005 is an existing signal gantry on the M2 foreshore. To complement the proposed road layout, it would be necessary to alter advance direction signage on the gantry. Such works would present an opportunity for Transport NI to replace the older matrix motorway indicator electronic signs on the gantry, in addition to associated corrugated metal fascias as part of separate proposals to extend the managed motorway system to the M2 and M3 in the longer term.

4.2.3.2.37 Gantry GY-006

Gantry GY-006 is an existing signal gantry on the M3 on-slip from York Street. To complement the proposed road layout, it would be necessary to alter advance direction signage on the gantry. Such works would present an opportunity for Transport NI to replace the older matrix motorway indicator electronic signs on the gantry, in addition to associated corrugated metal fascias as part of separate proposals to extend the managed motorway system to the M2 and M3 in the longer term.

4.2.3.2.38 Gantry GY-007

Gantry GY-007 is an existing sign gantry on the M3 off-slip to Nelson Street. It is proposed to retain this structure within the proposed road layout, with modifications as required to the associated advance direction signage on the structure.

4.2.3.2.39 Gantry GY-008

Gantry GY-008 is an existing signal gantry on the M3, spanning over the diverge nose for the off-slip from the M3 to Nelson Street. It is proposed to retain this structure within the proposed road layout, with modifications as required to the associated advance direction signage on the structure.

4.2.4 Geotechnics

4.2.4.1 Sources of Information

The design of geotechnical elements of the Proposed Scheme has been informed by the separately published Statement of Intent, Preliminary Sources Study Report (PSSR) and Ground Investigation Report (GIR), following the ground investigation contract conducted in 2013.

4.2.4.2 Bulk Earthworks

The vertical alignment and cross-section of the proposed road links within the scheme would require the excavation of large quantities of material from the site. From the identified ground conditions, it is anticipated that the majority of excavated material would be deemed unsuitable for reuse as fill material and would therefore require off-site disposal.

It should be noted that the ground investigation contract included geo-environmental testing at identified areas of potential contamination. Although the results from testing indicated that contamination levels did not exceed relevant threshold levels, it has been assumed that some arisings would contain contaminants and therefore require specialist handling and disposal.

As the majority of excavated material is unlikely to be suitable for reuse, it therefore follows that all embankments would require formation from imported fill.

A summary of the estimated bulk earthwork quantities is presented in Table 4.2.

Table 4.2: Estimated Earthwork Quantities

Cut Volume (m ³)	Fill Volume (m ³)
107,500	87,500

4.2.4.3 Earthworks and Associated Retaining Structures

In response to the anticipated poor ground conditions, it is proposed to support works to form new embankments, or widen existing embankments, using piled load transfer slabs.

Numerous retaining structures would also be required throughout the scheme and it is similarly proposed to support these structures using piled foundations.

4.2.4.4 Underpass Structures

As reported in Sub-Section 4.2.3.2.30, the proposed underpasses UP-001A, 001B, 002A and 002B over most of their length would comprise “U”- shaped reinforced concrete trough sections formed by diaphragm walls with a propping slab below road level or by secant piled walls with a separate inner U-frame trough structure. Typically, the decision on the form of the wall would be decided by the appointed contractor.

For the section of underpass carrying M2 to Westlink (Link No. 1) underneath the existing Lagan and Dargan bridges, the limited headroom under the existing bridges would render a secant pile option unviable from a construction viewpoint at these locations (CFA / bored pile rigs require headrooms in excess of 12m based on fail safe requirements during construction). Therefore, the design of this section of underpass is based on diaphragm walls only.

Underpass construction shall follow the ‘Bottom Up’ method, whereby upon completion of the diaphragm installation, the internal space shall be supported using temporary props throughout excavation until construction of the base propping slab, depending on the adopted final design approach.

In areas where the 1-in-200 year flood level exceeds the height of the underpass, the trough section would extend upwards until all flood requirements are satisfied (flood level + 0.7m freeboard).

The underpass and the reinforced concrete approaches would form a barrier, effecting short-term surface runoff and ground water connectivity in the area. The engineering effects of these have been considered and the following were incorporated into the design approach, as more particularly detailed in Chapter 16 (Road Drainage & the Water Environment).

Table 4.3 summarises the proposed underpass construction methods:

Table 4.3: Earthworks/Structures Summary

Structures Section	Type of Geo-solution	Foundation Type	Temporary Works Aspects	Remarks
UP-001A	Diaphragm walls as included in proposed and alternate options	Embedded walls with a propping base slab supported by piles as necessary	1. Possible ground treatment of the estuarine deposits; 2. Use of temporary props; 3. Ground water control; 4. Instrumentation and monitoring of the ground movements.	Proximity of existing structures and foundations is highlighted.
UP-001B				
UP-002A				
UP-002B				

4.3 Road Drainage

4.3.1 Introduction

As described in Chapter 16 (Road Drainage & the Water Environment) of this ES, the location of the Proposed Scheme is at the existing converging points of the strategic routes of the M2, M3 and Westlink. As set out previously, the natural topography of the study area is relatively flat and close to sea level. As a result of many years of development, the area has a ground surface finish which is predominantly impervious in nature.

While there would be a need for further consideration and development of the detailed construction proposals, the complexity of establishing a compliant and optimum drainage solution within an already highly developed and very constrained site has presented numerous challenges which have been overcome. Establishing a viable method of collecting the surface water run-off for the links associated with the Proposed Scheme has been one of these challenges. The complexities which the proposed layout would overcome include providing drainage facilities for underpasses which would have finished road levels some 7 metres below any potential appropriate discharge location. The solution embedded in the Proposed Scheme is the inclusion of a centrally located storm water pumping station to collect the surface water drainage and convey the water to an appropriate outlet. Additional complexities include ascertaining appropriate rates and volumes of storm water discharge, and obtaining agreement with the appropriate authorities to the acceptable permitted quantity and quality of the drainage water to be discharged.

In the environment of the finished road, surface water run-off collection for the Proposed Scheme would be achieved through a combination of road drainage gullies and combined kerb and drainage (CKD) systems, discharging to longitudinal collector pipes.

In seeking to develop a proposal which embraces all of the drainage challenges in the area, consultations were carried out with NI Water to seek to achieve an agreed drainage strategy for the York Street Interchange site, which is outlined below. As described previously, storm

water falling on the scheme area currently drains to the local combined sewer network which then outfalls into the existing Low Level combined sewer in Corporation Street (Link No. 43). In keeping with best practice and to deliver improvement to the NI Water sewerage system, the potential to separate storm water and take it out of the combined sewers as part of the York Street Interchange Scheme was reviewed. It was agreed between Transport NI and NI Water that the optimum solution i.e. to seek to provide maximum available storm water separation within the York Street Interchange proposals, should be the basis of the drainage solution. This approach would provide a significant reduction in storm water discharge from the wider scheme area, which would lessen the frequency of surcharging within the existing NI Water sewerage network.

4.3.2 **Road Drainage Strategy**

Whilst acknowledging that the scheme drainage proposals would be subject to detailed design development, the procedures utilised in the development of the drainage design at its current stage are consistent with the principles and requirements defined in the Design Manual for Roads and Bridges (DMRB) and relevant current Regulations, Orders and European Directives.

Based on the foregoing, the design has been developed in such a manner as to:

- address road safety issues pertaining to the accumulation of surface water as defined in the DMRB;
- provide an effective system, using normally available and readily maintained components, for conveying surface water arising from the new road to the receiving watercourses, waterbodies or drainage systems;
- incorporate facilities to inhibit discharge of sediments and significant volumes of hydrocarbons, prior to discharge to the receiving waterbodies or drainage systems; and
- provide facilities to isolate the drainage system from the receiving watercourses in the event of significant spillages of contaminants.

4.3.3 **Description of Proposed Drainage Infrastructure**

The nature of the road link alignments associated with the Proposed Scheme would result in significant lengths of new carriageway being constructed considerably below the existing ground levels in the area surrounding the site of the Interchange, and well below any acceptable potential outfall location within the area. This situation presented a challenge to the development of a drainage network which met the requirements of the appropriate statutory bodies and design standards.

In the Proposed Scheme, the underpasses would be drained through the use of CKD systems which would in turn discharge to a system of carrier drains. Utilising CKD systems has been the basis of the underpass drainage design because their installation would assist in minimising the depth of drainage construction below carriageway surface levels.

The very depressed level of the network of carrier drains within underpasses, which in turn would link between underpasses, necessitated the provision of a central storm water pumping station which would be constructed to lift storm water drained from the road carriageway upwards to a level where it would then discharge via a rising main outfall pipeline to the Belfast Harbour. The following points are a summary of the main features of the proposed storm water pumping station, which would be developed as part of York Street Interchange:

- The outer structure (wet well and valve chamber) would be integral with underpass walls;

- The sump level in the storm water pumping station wet well = -14m AOD approx. (top of floor slab);
- The pumping installation would be designed to accommodate all road drainage discharges, emanating from the catchment areas, for all events up to a 1% AEP (1-in-100 year return period) design storm event, without the risk of flooding or surcharge occurring within the underpass structures. Road edge drainage detail within the underpasses would be designed to accommodate all rainfall intensities associated with all events up to a 1% AEP without surcharge onto the road carriageway;
- Two pump sets (i.e. 2 high flow and 2 low flow pumps). The pumps proposed would be close coupled wet well submersible pumps;
- Two continuously rising outlet (1 low flow and 1 high flow) mains. Two pumping mains are proposed as this would deliver the optimum solution to cater for the large range in flows and minimise possible sedimentation problems which could arise if a single pumping main was to be installed;
- An outfall structure at the connection point to the proposed outlet, which would utilise an abandoned Combined Sewer Overflow (CSO) culvert near Gamble Street;
- A wet well which would facilitate the attenuation of peak flow discharges and thereby deliver a reduced size of outfall rising mains;
- The capability for total shut down of flow discharge in the event of an accidental spillage occurrence on the road carriageway; and
- Flood resilience measures to ensure continuous operation of the pumping station would be maintained up to and during a 0.5% AEP (1-in-200 year) coastal flood event, including the provision of a permanent standby generator and dual network supplies from the electricity network.

The drainage solution developed for the Proposed Scheme seeks to maximise the drainage catchment area that would discharge storm water to the pumping station and which would then be conveyed onwards via the new pumping main arrangement to the outlet point near Gamble Street. The existing abandoned CSO culvert which would be utilised, discharges through an outfall structure in the quay wall to Belfast Harbour. However, the potential for coastal flooding within the area together with other constraints, has restricted the extents of the catchment areas to predominantly the trunk road network. This action was taken in order to ensure that the potential for the back flow of coastal flood waters is removed and the risk of compromising the underpass flood protection proposals would be minimised.

The proposed location for the storm water pumping station is shown on Figure 16.7. The proposed storm water pumping station would be developed to ensure that the project complies with the core requirements of DMRB Volume 4, Section 2, HD 33/06 entitled "Surface and Sub-surface Drainage Systems for Highways".

Other road drainage outfalls would be required for connector roads adjacent to the Proposed Scheme outside the extents of underpasses. Similarly, these would be required in areas where storm separation is not feasible, for example in the area of York Street. In such scenarios, the associated storm drainage outfalls would be achieved through discharge to gravity pipe connections into the existing and proposed combined sewerage network, as shown in Figure 16.7.

4.3.4 Interconnecting Pipework linking the Underpasses to the Pumping Station

Incorporating a central storm water pumping station as described above into the Proposed Scheme, would result in the need for a number of suitably robust interconnecting storm water carrier pipelines at considerable depths below existing ground level. These interconnecting pipelines would provide links between each of the respective low points within the 4No. proposed underpasses and the storm water pumping station. The proposed layout of these interconnecting pipes can be seen in Figure 16.7. In accordance with Chapter 6.4 of DMRB HD 33/06 Surface and Sub-Surface Drainage Systems For Highways, and through consideration of the risks associated with a flooding event within the York Street Interchange underpasses, arising from a rainfall event, the proposed carrier and interconnecting pipework and the pumping station wet well capacity and arrangement would be designed to accommodate a 1-in-100 year (AEP of 1%) road drainage design storm event.

4.3.5 Road Edge Detail

The Stage 3 drainage design proposal has sought to provide the optimum road edge detail whilst being mindful of the required vertical clearances between finished underpass carriageway levels and the top of structural slabs. In order to minimise this vertical clearance distance and therefore keep the level of the proposed structural propping slab as high as possible within the sections of the roadway in underpasses, the road edge detail proposed in the Stage 3 design has been progressed on the basis that CKD systems would be installed during the construction sequences.

Outside of the proposed underpass structure extents, the proposed road edge detail and carriageway drainage regime would be less restricted, as it would not be subject to the structural constraints and depth restrictions outlined above.

4.3.6 Proposed Road Drainage

To minimise the number of discharge points and associated discharge rates to the combined sewerage system, the Proposed Scheme includes the provision of lengths of new storm water carrier drainage in addition to the combined NI Water sewer network up to the extremities of the anticipated site area. This proposed approach makes provision for future works by NI Water who would be seeking to deliver further separation of storm water and foul sewage for the wider York Street/North Queen Street/Dock Street/Great George's Street area. The following sub-sections outline the road drainage proposals for the various links.

4.3.6.1 Westlink to M2 (Link No. 1) and M2 to Westlink (Link No. 2) (Between North Queen Street and York Street)

The catchment area draining from the high point includes North Queen Street Bridge (BR-001) which carries the Westlink, and the road carriageway which extends in an easterly direction towards the underpasses. The catchment for this contributing area would include drainage intercepted outside of the underpass retaining wall extents. Utilising CKD and conventional gullies, the storm water collected would discharge to the storm water pumping station.

4.3.6.2 York Street to York Road (Link No. 11), M3 to York Street (Link No. 7), Great Patrick Street to Dunbar Link (Link No. 13) and Frederick Street (Link No. 14)

On York Street Bridge (BR-002A&B) there would be a high point in the vertical alignment between the two bridge structures. The proposed drainage at this point would break and flow in opposing northerly and southerly directions. The northerly drainage is discussed in Sub-Section 4.3.6.3.

The section south of the high point would drain through CKD. The runoff collected along Great Patrick Street/Frederick Street (Link Nos. 13 & 14) and York Street to York Road (Link No. 11) (south of York Street Bridge (BR-002A&B)) would drain into new separate storm drainage systems upstream of connections into the existing or proposed combined sewer network and ultimately discharging into the Low Level Sewer in Corporation Street (Link No. 43).

4.3.6.3 *Westlink to York Street (Link No. 5), York Street to York Road (Link No. 11) and Dock Street (Link No. 10)*

York Street to York Road (Link No. 11) (north of York Street Bridge (BR-002A&B)) would discharge into a new separate drainage collector pipe, before discharging into the existing sewerage system at appropriate locations.

Westlink to York Street (Link No. 5) would discharge to a drainage collector pipe at the low point in the link and would be discharged to a suitable location on York Street to York Road (Link No. 11).

On Dock Street (Link No. 10), collected storm water would discharge into the existing sewerage system at suitable connection points.

4.3.6.4 *Westlink to M2 (Link No. 1), M2 to Westlink (Link No. 2), M2 to M3 (Link No. 8), M3 to M2 (Link No. 9) and York Street (South) to M2 (Link No. 15) Motorway Drainage*

Storm water generated from the area of Dock Street Bridge (BR-005) would be collected before being connected into networks of carrier drainage systems that would flow south towards the storm water pumping station. Numerous additional connections would be made to this collection system, upstream of its connection point to the pumping station, having carried surface water to low points in the vertical alignment through CKD or gullies.

In the proposed scenario the M2 motorway drainage, north of Dock Street Bridge (BR-005), would drain as it currently does to the Mile Water River Culvert. The northerly drainage will be discussed in Sub-Section 4.3.6.7. Similarly, the elevated M3 Lagan Bridge would be drained to Belfast Harbour predominantly through the existing storm drainage network. Based on the adopted design approach, which seeks to maximise storm water separation from the sewerage system, within the Stage 3 design, it has been feasible to redirect discharge of the motorway area between the M2 and M3 transition, to the pumping station.

4.3.6.5 *Dock Street to M3 (Link No. 6)*

The drainage surrounding Dock Street to M3 (Link No. 6) would have 3 different discharge points. The first discharge point would be close to Dock Street (Link No. 10) and would dispose of the surface water from the high point on the road into the existing combined sewerage system. The second and third proposed discharge points would be located at either side of the bridge over the M2 to Westlink (Link No. 2) and both would discharge to the storm water pumping station.

4.3.6.6 *Nelson Street (North) (Link No. 29)*

In the area of Nelson Street (North) (Link No. 29), the storm water would drain towards low points and discharge at suitable points into the existing combined sewerage system.

4.3.6.7 *North of Dock Street Bridge (BR-005), Westlink to M2 (Link No. 1), M2 to Westlink (Link No. 2), and M2 to M3 (Link No. 8)*

From a high point in the vertical alignment north of the Dock Street overbridge (BR-005), the M2 carriageway slopes north towards a low point near where the Mile Water River culvert

passes beneath the M2. Proposed drainage solutions for these areas would involve surface water eventually discharging to the Mile Water River Culvert. The areas that would be drained by this network of drainage pipes and conduits are, the Westlink to M2 (Link No. 1) and the M2 to M3 (Link No. 8) north of Dock Street Bridge (BR-005), and M2 to Westlink (Link No. 2) north of the proposed new Dock Street Bridge (BR-004).

4.3.6.8 Underpass UP-001A – M2 to Westlink (Link No. 2)

Storm water from the area of the proposed new bridge over Dock Street (BR-004) would be collected and conveyed in a southerly direction; it would then be intercepted near where Link No. 2 is at grade (approx. at the location of the existing Trafalgar Street) and carried through a network of drainage pipes which would receive other drainage connections upstream of its point of discharge to the storm water pumping station. The remaining area of the underpass catchment would be drained by CKD before being discharged at the low point of the underpass into the collector network. Downstream of this low point, as with the other underpasses and owing to their associated alignment sag curves, the collector drainage would need to connect through the underpass wall to facilitate discharge to the storm water pumping station.

4.3.6.9 Underpass UP-001B – M3 to Westlink (Link No. 4)

In the area of the M3 to Westlink (Link No. 4), there would be three discharge points. The first would be located at the lowest point within the underpass and the runoff collected from this area would discharge to the storm water pumping station. The second would also discharge storm water to the pumping station but in addition would collect storm water from outside of the underpass from the direction of the M3 Lagan Bridge to the south. The third would discharge runoff collected from the area of Great George's Street towards M3 to York Street (Link No. 7) and would discharge the storm water into the existing combined sewerage system upstream of its connection to the Low Level Sewer in Corporation Street (Link No. 43). The reason for discharge of this area to the sewerage network being that it is outside of the area of the scheme which would be protected from inundation during a 0.5% AEP coastal flood event.

4.3.6.10 Underpass UP-002A – Westlink to M2 (Link No. 1)

Storm water generated within the underpass would be collected by CKD and discharged at the low point within the underpass to the carrier drainage system that would discharge to the storm water pumping station.

4.3.6.11 Underpass UP-002B – Westlink to M3 (Link No. 3)

Storm water from the area of the Westlink to M3 (Link No. 3) would have 3 different discharge points. The first would be located at the lowest point within the underpass and from this point a carrier drainage network would convey flow and would discharge to the storm water pumping station. The second and third discharge points would be located at either side of the proposed road bridge over M2 to Westlink (Link No. 2). These discharge points would dispose of runoff collected from outside of the underpass (area south of the underpass) and would ultimately discharge to the storm water pumping station.

4.3.6.12 Duncrue Street to Westlink (Link No. 31)

It is proposed that the area of Duncrue Street to Westlink (Link No. 31) and Duncrue Street (Link No. 29) would be drained in a northerly direction and would discharge to the Mile Water River Culvert, as shown on Figure 16.7. This approach again seeks to limit the areas which would discharge to the sewerage system and to maximise storm water separation.

4.3.7 **Further Drainage Measures**

As described in sub-section 4.2.3.2.30, the underpasses would be designed as sealed structures with sufficient load bearing capacity and flexural strength to prevent flotation or seepage ingress from groundwater. This approach to the structural design of the underpasses would mean that within their structural formation between the finished road surface and the top of propping slab level, there would be no requirement to collect and dispose of significant quantities of groundwater.

In order to comply with DMRB, further drainage measures including surface water drainage solutions would be required in isolated areas adjacent to the site which are not specifically highlighted in earlier paragraphs. These areas include the central scheme areas which may be landscaped and would, for example, be included in the pumping station catchment area, areas where the adjacent ground slopes towards the scheme, areas of proposed or existing engineered/earthworks slopes, footways or finally, paved areas within the site where storm water could potentially pond or accumulate.

4.4 **Public Utilities**

Significant diversions of utilities infrastructure and mitigation measures would be necessary as a result of the various elements involved in construction of the Proposed Scheme. Due to the nature of the scheme, these elements include retaining walls, underpasses, bridge piers, bridge abutments, embankments and other minor road alterations, such as kerb realignment and carriageway level alterations. Ground conditions in the study area generally at formation level have low bearing capacity and therefore it would be necessary for foundation strengthening works to be undertaken to provide support to foundations for the proposed retaining walls, bridge piers, bridge abutments and embankments. The intrusive nature of the works required to construct these individual elements would lead to severance of the existing utilities networks located within the study area. Therefore, significant diversionary works and mitigation measures would be required to ensure supply networks and systems are not detrimentally affected.

Following Stage 2, further consultations with affected utility providers have taken place at Stage 3 in order to establish the scale, scope and potential cost of mitigation measures which would be required to facilitate construction of the Proposed Scheme, whilst ensuring minimum disruption to their affected customers in the vicinity of the study area. Emerging out of these further consultations and from information provided by the various utility companies, it has been established that the majority of service utilities to be diverted would be located in York Street, North Queen Street, Great George's Street, Nelson Street, Dock Street, Duncrue Street and around York Link.

4.5 **Motorway Communications**

4.5.1 **Overview**

Intelligent Transport Systems (ITS) would form an integral part of this scheme throughout the new interchange, connecting the Westlink, M2 and M3. Therefore consideration has been given to the provision of technology within the Proposed Scheme in line with current Design Manual for Roads and Bridges (DMRB) principles and standards, considering the current provision of technology and standards on the Westlink, M2 and the M3. The strategy would provide complementary measures to support the operation of the Proposed Scheme, providing operational signing, traffic monitoring and CCTV surveillance during normal and abnormal conditions on the network.

In the wider context, the implementation of technology on the new sections of the network would allow the Proposed Scheme to be operationally managed by Transport NI. The design

of this provision takes into account the specific transport planning objectives of the scheme, with technology provided to support the wider scheme objectives.

4.5.2 **Operational Management**

Operational management of the Proposed Scheme would be developed to deliver optimum throughput of vehicular traffic within a safe, efficient and reliable environment; providing local and strategic traffic information to road users during normal and abnormal conditions. The operational management provided by the provision of technology assets would assist in the delivery of this objective. Operational management would be achieved under the operational regimes detailed in Table 4.4 and monitored through the Transport NI Traffic Information and Control Centre (TICC).

Table 4.4: Operational Management Regimes

Operational Characteristic	Description
Normal Operation	Under normal operation conditions, the operational regime would provide coverage of the Proposed Scheme network assets and would integrate roadside infrastructure, with the existing TICC strategic driver information system allowing the control centre staff to monitor and respond to incidents or unusual traffic situations as they arise.
Journey Time Reliability	Variable Speed Limits can be set to provide consistent flow and journey time reliability during periods of congestion or anticipated heavy traffic.
Incident Control	Lane signalling and message signs would provide automatic incident management, queue protection and slip road management during incidents.

4.5.3 **ITS Components**

The ITS components that have been considered to be provided as part of the Proposed Scheme are detailed in Table 4.5.

Table 4.5: ITS Components in Proposed Scheme

ITS Component	Description
Lane Signalling	Overhead signalling deployed above each running lane for displaying lane control aspects, and advisory speed limits.
Variable Message Signs	Used for displaying strategic and tactical driver information messages.
Incident Detection	Uses MIDAS for real-time detection of traffic to identify incidents / events occurring on the interchange, so that TICC control room staff can implement strategies to mitigate the effects and manage safety.
CCTV surveillance	For visual monitoring of the York Street Interchange, the Westlink, M2 and M3. This would allow the monitoring of traffic flow in real time.

ITS Component	Description
Communications Network	To collect and disseminate real-time travel information and provide network control of signs, signals and other telecommunications equipment associated with the interchange.
Entry control	Post mounted signals for entry stop and speed equalisation at the entry to slip roads, joining the interchange.
Telephones	These have not been considered as part of the proposals for the various interchange links, having considered that the interchange does not allow for safe stopping locations within the scheme limits. However, existing emergency telephones on the M2 and M3 hard shoulders would be retained.

The following sections describe the proposed technology measures within the scheme.

4.5.4 **Westlink to the M2 and M3 Motorways**

To manage traffic from the Westlink to the M2 and M3 motorways, it is proposed to provide lane and speed management. Lane control signals on the mainline carriageway over each lane would be provided using a new confirmatory gantry at the start of the scheme from the east/northbound Westlink. The lane control signals would ensure a safe lead-in sequence prior to the interchange with the M2 and M3 motorways.

These signals would inform drivers of lane/road closures ahead and display speed limits following an incident or during periods of congestion on the York Street exit, M2 northbound and M3 eastbound carriageways.

Driver messaging would also be provided by variable message signing mounted on the new gantry. The variable message sign on this gantry would enable strategic and tactical messages to be relayed to road users on potential hazards on the road network further downstream as the Westlink diverges at the York Street exit, M2 northbound and M3 eastbound carriageways.

Detection loops would provide the Technology Communications Network with congestion alerts and would allow incidents or events to be identified and managed on the York Street exit slip road, M2 northbound and M3 eastbound carriageways.

A PTZ (Pan Tilt and Zoom) CCTV camera mounted on the new gantry would provide coverage of the approach to the new diverge with the M2/M3 and the York Street exit from the Westlink.

The camera would also provide overlapping coverage with the existing Westlink CCTV system and underneath the York Street Bridge.

4.5.5 **M3 / Westlink and York Street to the M2 North**

It is proposed to extend the existing intra-junction gantry on the M2 northbound carriageway to accommodate the new interchange road layout.

To manage traffic from the M3 / Westlink and York Street to the M2 northbound, it is proposed to provide lane and speed management. Lane control signals on the mainline carriageway would be provided using the extended gantry located over the York Street on-slip and the

merge point for the Westlink and M3 motorways. These lane control signals would ensure a safe lead-in sequence prior to the merge with the M2 motorway.

The lane control signals would inform drivers of lane/road closures ahead and display speed limits following an incident or during periods of congestion on the M2 northbound motorway. Driver messaging would be provided by a variable message sign mounted on the gantry. The variable message sign on this gantry would enable strategic and tactical messages to be relayed to road users on potential hazards on the road network further downstream as the Westlink, York Street entry slip road, and the M3 merge with the M2 northbound carriageways.

Prior to joining the M2 northbound from the York Street interchange, on-slip Advanced Motorway Indicators (AMIs) would inform road users of any speed restrictions/closures.

Detection loops would provide the Technology Communications Network with congestion alerts and would allow incidents or events to be identified and managed on the M3, Westlink and York Street entry slip road.

A PTZ CCTV camera mounted on the gantry would provide coverage between the Dargan Bridge and the M2/M3 interchange, as well as the northbound M2 motorway.

4.5.6 M2 Southbound to the Westlink and M3 Motorway

It is proposed to utilise the two existing gantries on the M2 southbound carriageway. These gantries would accommodate the lane signalling and variable message signs.

To manage traffic from the M2 southbound to the Westlink and M3 motorway, it is proposed to provide lane and speed management. Lane control signals on the mainline carriageway over each lane would be provided using the existing gantries located over the M2 southbound motorway. The lane control signals would ensure a safe lead-in sequence prior to the merge with the Westlink and M3 motorway.

The lane control signals mounted over each lane would inform drivers of lane/road closures ahead and display speed limits following an incident or during periods of congestion on the Westlink and M3 motorway. Driver messaging would be provided by a variable message sign mounted on the existing confirmatory gantry located on the M2 southbound prior to the Westlink off-slip. The variable message sign on this gantry would enable strategic and tactical messages to be relayed to road users on potential hazards on the road network further downstream on the Westlink and M3 motorway.

Prior to joining the Westlink from the Duncrue Street junction and the M3 from the Nelson Street junction, on-slip AMIs would inform road users of any speed restrictions/closures.

Detection loops would provide the Technology Communications Network with congestion alerts and would allow incidents or events to be identified and managed on the M2 southbound, Westlink and M3 motorway.

4.5.7 Standalone CCTV

A PTZ CCTV camera mounted at the Duncrue slip road would provide coverage of the Duncrue Street junction, northbound and southbound M2, and the westbound Westlink entry slip from the Duncrue Street junction.

A second PTZ CCTV camera mounted in the centre of the westbound Westlink entry slip road would provide coverage of the M2 / Westlink from the M2 diverge to the underpass section beneath the Dargan and Lagan bridges. This camera would also provide coverage of the Dock Street and M3 entry slip road on Nelson Street.

A third PTZ CCTV camera mounted to the wall section of the westbound Westlink would provide coverage of the short underpass section of the entry slip road from the M2 to the Westlink as it passes beneath the M3 Lagan Bridge and the Dargan Bridge.

A fourth PTZ CCTV camera mounted in the centre of the York Street interchange would provide coverage between the York Street Bridge and the Lagan and Dargan bridges. This would include coverage of York Street, Great George's Street, Nelson Street and Great Patrick Street.

4.5.8 Communication Interrupters

Communication Interrupters would be required to maintain the operability of the existing Technology Communications Network and Urban Traffic Control (UTC) of temporary traffic signals during the York Street Interchange construction works.

The Communication Interrupters would take the form of a direct temporary cable or link to other third party networks such as BT PSTN or wireless links, after consultation with the TICC and technology maintainers.

The following locations would require Communication Interrupters prior to the York Street Interchange works:

- the eastbound Westlink communications network, upstream of the new gantry position;
- the southbound M2 communications network, upstream of the Duncrue Street interchange; and
- the M3 eastbound communications network after the M2 / M3 motorway merge.

4.6 Health and Safety

Throughout the development of the scheme, consideration has been given to health and safety risks during the full project lifecycle in accordance with the Construction (Design and Management) Regulations (Northern Ireland) 2007.

Transport NI, as Client under the Regulations, has appointed a CDM Co-ordinator from URS from the onset of the project. The appointed CDM Co-ordinator has submitted an initial notification of the project to the Health and Safety Executive for Northern Ireland (HSENI). Given the complexity of the scheme, the design team has paid particular attention to risks during the construction phase of the scheme, with the completed buildability assessment including a consideration of risks to workers and road users during construction, with the appointed CDM Co-ordinator in attendance to advise the team as required. Throughout the preliminary design process, every effort has been made to eliminate foreseeable hazards and reduce risks where possible. However, this is not always achievable, and where hazards remain, measures to reduce the residual risks would be implemented.

Due to the complexity of the scheme, there are likely to be a number of unforeseeable hazards and risks that may only materialise as a detailed design is developed. Such hazards and risks would be assessed as and when they are identified.

4.7 Construction

4.7.1 Construction Sequence

4.7.1.1 Overview

To demonstrate that the scheme could be built within its constraints whilst maintaining routes for traffic, a notional construction sequence was developed as illustrated on Figure 4.5.

In developing the construction sequence, cognisance was taken of the potential for works to strengthen the Dargan Bridge foundations (to facilitate any future dualling scheme) to be undertaken as part of the construction contract. The sequence did not, however, consider the works to the superstructure to replace or otherwise widen the existing deck.

The priority of works elements that informed the developed notional construction sequence is outlined below:

1. completion of site clearance works;
2. completion of service diversions;
3. construction of section of M2 to Westlink underpass (BR-003) under Lagan Bridge, including pier foundation strengthening works (FS-001);
4. construction of new bridges at York Street (BR-002A and BR-002B) and approaches;
5. construction of Westlink to M2 and M3 underpasses (UP-002A and UP-002B);
6. construction of remainder of M2 to Westlink underpass (UP-001A);
7. construction of M3 to Westlink underpass (UP-001B); and
8. construction of Dock Street to M3 link (Link No. 6) and completion of pumped drainage outfall route.

Once site clearance works are complete, all proposed service diversion works would be carried out as the highest priority element of work, to allow subsequent works to be completed in cleared areas of the site. Once the service diversions are completed, works to complete the section of UP-001A under the Lagan and Dargan bridges, including pier foundation strengthening works, would be prioritised as they will be complex and slow to progress with specialist plant, therefore presenting the biggest risks to overall duration.

Before the various underpasses can be constructed, it would be necessary to grade separate traffic flows through the works area. Accordingly, the completion of the York Street bridges (BR-001 and BR-002) would be considered the next priority element in the programme. With the bridge completed, traffic flows would be sufficiently separated to permit works to construct the underlying underpasses. Until such time as the underpasses were complete, however, the completed bridges (and approach embankments) at York Street would form key three-dimensional constraints to temporary traffic management arrangements.

Whilst a notional construction sequence has been developed, it must be borne in mind the actual construction sequence for the scheme would ultimately be determined by the appointed contractor informed by contractual requirements in relation to lane availability on the existing network and a requirement that the strengthening of foundations to the existing Lagan Bridge are undertaken prior to the installation of new embedded retaining walls.

4.7.1.1.1 *Phase 1*

Phase 1 is illustrated on Figure 4.5 (Sheet 1).

The first phase of the proposed construction sequence would involve site clearance, including the completion of any demolition works to existing buildings. These works would be undertaken using lane and hard shoulder closures on the existing routes as required. It should be noted that in order to provide access and egress to site clearance works on the Westlink, it would be proposed to close the north-facing Clifton Street on and off-slips.

Based on the developed construction programme, it is expected that these works would require a minimum of 5 weeks to complete.

4.7.1.1.2 *Phase 2*

Phase 2 is illustrated on Figure 4.5 (Sheet 2).

The next phase of the proposed construction sequence would be the diversion of services in advance of the construction of the new bridge, underpass and wall structures.

In order to construct Service Route A to the west of the proposed York Street bridges (BR-001A and BR-002B), including the construction of culverts CU-003 and CU004, it would be proposed to temporarily realign the Westlink approach to York Street, to a position adjacent to the southbound Westlink carriageway. York Street would also be temporarily realigned between York Link and Cityside Retail Park to facilitate the works. In order to construct CU-004, it would also be necessary to close Great George's Street from York Street to Portland Place, with an alternative route for affected residents via temporary conversion of the remaining section to two-way running, with minor enabling works at the junction with North Queen Street. Works to complete the crossing of York Street for culvert CU-004 would be undertaken using full weekend closures of the junction with Great George's Street. In order to finalise connections to the relocated NIE substation at Galway House, it would be proposed to close access to the M2 via the existing southbound lane on York Street. The proposed traffic management arrangements would also provide the opportunity to construct the new retaining wall RW-007 at Molyneux Street/Henry Street.

In order to construct Service Route E on Great George's Street, including the construction of culvert CU-002, it would be necessary to realign Great George's Street north of its current position. However, in order to complete all service crossings at Nelson Street, it would also be necessary to close the junction for a weekend.

Service Route F could be largely constructed from an offline position, however, a number of crossings would be required that would require weekend closures of the connection of the on-slip from Nelson Street to the M3, with associated closures on approaches from Westlink and York Link. Similarly, works to complete crossings at Dock Street would require lane closures and/or a full closure of the junction.

Importantly, the proposed service diversions include works to relocate 110kV NIE power cables at Whitla Street subway, as part of Service Route G. The nature of these service diversion works would require the complete closure of the northern section of Nelson Street (between Dock Street and Duncrue Street), with the proposed re-routing of northbound traffic from Dock Street via a temporary two-way arrangement on Garmoyle Street and Whitla Street. Enabling works would be required to install the arrangement, with an associated loss of southbound capacity on the route from the M2 to City Centre.

The proposed closure of Nelson Street between Dock Street and Duncrue Street would provide the opportunity to construct other elements of the future M2 to Westlink (Link No. 2)

and Duncrue Street to Westlink (Link No. 31) alignments, including retaining walls RW-024 and RW-029, the extension to Whitla Street Subway (BR-006) and the northern abutment for the proposed new Dock Street overbridge (BR-004). Works at Whitla Street would require the closure of the existing subway, with re-routing via Dock Street.

Elsewhere within the site, the proposed traffic management arrangements would provide the opportunity to commence the installation of a number of the underpass and pumping station retaining walls, once adjacent service diversions are complete. These would be typically constructed up to below ground level and covered over as required to facilitate future traffic management scenarios.

The construction of the pumped outfall route (off-line works) from the scheme to the existing Gamble Street CSO would be commenced in parallel with these works, again in recognition of the potential for encountering unforeseen obstructions to the thrust boring operation.

Based on the developed construction programme, it is expected that these works would require a minimum of 27 weeks to complete.

4.7.1.1.3 **Phase 3**

Phase 3 is illustrated on Figure 4.5 (Sheet 3).

The next phase of the construction sequence would be the completion of the section of M2 to Westlink underpass (UP-001A) underneath the Lagan and Dargan bridges.

In order to provide sufficient working space for these works, it is proposed to temporarily realign the movement from M2 to Westlink into lands at Corporation Street, with an accompanying realignment of the movement from Westlink to M3 to the next “gap” south in the Lagan and Dargan bridge pier positions, at Shipbuoy Street.

York Street and Westlink would remain in their revised positions from Phase 2, with works commencing on the northern side of the Westlink to construct retaining wall RW-001 and the widening of North Queen Street Bridge (BR-001). In addition, works to construct the proposed reinforced slope EB-001 to the rear of properties at Little George’s Street would also be undertaken. This would include any enabling works to excavate and remove part of the existing Westlink embankment to provide a piling platform for the works.

In order to construct retaining wall RW-020, it would be proposed to reduce the York Street on-slip to the M2 to two lanes, with the completion of the wall allowing works to construct the new slip road from York Street to M2 (Link No. 15) to proceed, along with works to widen the existing Dock Street Bridge (BR-005) to the west.

At Dock Street, the new element of work would be the construction of the central bridge piers for the new overbridge (BR-004). This would require the realignment of lanes at the Dock Street/Nelson Street junction and the continued closure of the northern section of Nelson Street between Dock Street and Duncrue Street, with a substitute two-way arrangement on Whitla Street and Garmoyle Street. In conjunction with this closure, it would be necessary to close the southern section of Nelson Street between Dock Street and York Link to facilitate the construction of the new bridge piers and traffic islands. The connection between Dock Street and York Link would be provided via a substitute temporary arrangement from Corporation Street, which would require the temporary closure of the northbound bus lane from Clarendon Dock to Dock Street. Once the piers are in place, works would progress to form the remainder of the bridge, with the northern span constructed first, then followed by the southern and central spans. Works to construct the central spans would be carried out over the live underlying carriageway, with bridge beams craned into position using overnight or weekend closures of the junction.

Through discussions with the buildability advisor, it was noted that the use of temporary end walls would provide an opportunity to proceed with construction of the various underpasses in isolated section. Based on this, it would be proposed to commence construction on an isolated section of the M2 to Westlink underpass (UP-001A) in an offline position at lands beside Corporation Street.

Based on the developed construction programme, it is expected that these works would require a minimum of 27 weeks to complete.

4.7.1.1.4 Phase 4

Phase 4 is illustrated on Figure 4.5 (Sheet 4).

The next phase of the construction sequence is the commencement of works to construct the two new bridges at York Street (BR-002A and BR-002B) and associated embankments. On this basis, the next phase of temporary traffic management would involve the realignment of York Street east of its current position. The resulting space would be used to construct the southern abutment and piers to bridge BR-002A. The northern abutment to BR-002A would not be constructed at this time, with the Westlink to York Street alignment realigned to run over the location of the future abutment, thereby allowing construction of the new retaining walls RW-031 and RW-033. At the same time, the piers and abutments for bridge BR-002B would be constructed, along with some isolated sections of retaining walls.

Following the completion of widening works to the Westlink in the previous phase, the next phase of work at North Queen Street Bridge (BR-001) would involve the realignment of traffic to the northern extents of the widened carriageway, providing space for works to widen the southern part of the bridge to commence. At the same time, works to construct RW-002 and the reinforced slope to the existing Great George's Street retaining wall (EB-002) would also be progressed, requiring the temporary excavation of part of the existing Westlink embankment to form a piling platform.

At Dock Street, with the construction of the proposed new Dock Street Bridge (BR-004) and the completion of works to widen the existing Dock Street Bridge (BR-005), works would involve the construction of the new junction layout at Dock Street using overnight or weekend closures as appropriate. When the new junction arrangement and northern section of Nelson Street (Link No. 29) is substantially completed, the temporary two-way arrangement on Garmoyle Street and Whitla Street would be removed.

Based on the developed construction programme, it is expected that these works would require a minimum of 13 weeks to complete.

4.7.1.1.5 Phase 5

Phase 5 is illustrated on Figure 4.5 (Sheet 5).

Following the construction of the southern bridge at York Street (BR-002A), works would progress to start construction of the southern approach embankment (EB-003) using piled load transfer slabs. The southern embankment would be completed in two halves, with a south-west portion of the embankment initially constructed. To provide sufficient working space, it would be necessary to realign York Street into lands north of Philip House. It is this requirement for the construction of the embankment which has provided the basis for inclusion of affected lands within the draft Vesting Order and therefore, the need to demolish the existing single-storey buildings to the north of Philip House.

Based on the developed construction programme, it is expected that these works would require a minimum of 5 weeks to complete.

4.7.1.1.6 Phase 6

Phase 6 is illustrated on Figure 4.5 (Sheet 6).

With works to construct the south-west portion of embankment EB-003 completed, the temporary traffic management layout on York Street would be switched to realign lanes into the existing car park at Great George's Street (Lancaster Street). This arrangement would provide the necessary working space to construct the south-east portion of the embankment, subject to an initial reduction in the number of lanes on York Street to three, opening to four lanes in due course. The reduction to three lanes would require associated lane closures on Great Patrick Street. It should be noted that under the proposed arrangements, the distance between the two major temporary signalised junctions on York Street would be shortened and this may lead to potential operation issues.

The proposed traffic management arrangements would also provide the opportunity to commence works associated with the connection of the new interchange link from Westlink to M2 (Link No. 1) to the existing M2 countrybound carriageway.

Works would also be commenced at this time to alter the existing off-slip from the M3 to Nelson Street, with realignment of lanes on the off-slip as appropriate.

Based on the developed construction programme, it is expected that these works would require a minimum of 5 weeks to complete.

4.7.1.1.7 Phase 7

Phase 7 is illustrated on Figure 4.5 (Sheet 7).

With works to construct the southern embankment to the York Street bridges (BR-002A and BR-002B) completed, works would then commence on construction of the northern embankment (EB-005). With retaining wall RW-007 in place, works would entail the similar construction of piled load transfer platforms and the placement of imported fill to form the embankment structure. To support the placed fill, above ground elements of the Westlink to M2 underpass retaining walls would need to be constructed where possible. In order to maintain connection to York Street and the M2 during these works, it would be necessary to realign York Street to the east of the proposed bridge structures, with a temporary retaining solution required to support the construction of the northern embankment.

Based on the developed construction programme, it is expected that these works would require a minimum of 5 weeks to complete.

4.7.1.1.8 Phase 8

Phase 8 is illustrated on Figure 4.5 (Sheet 8).

To complete the remainder of the northern embankment (EB-005) at York Street, traffic on York Street would be effectively split at the junction with Great George's Street around the site of the future York Street bridges and new retaining walls. Two lanes would continue around the western side of the new bridges and retaining walls to provide connection to York Road, whilst a further two lanes would provide connection from York Street to the M2. Changes would also be made to the layout of the major temporary signalised junctions on York Street, with an additional two junctions being required to facilitate the proposed realignment of York Street and the Westlink.

It should be noted that the proximity of several major temporary junctions, and the anticipated traffic flows, is likely to present operation problems for the junctions for the duration of this phase of traffic management.

In order to complete the section of the embankment, works would also include the construction of the final above ground section of the Westlink to M2 underpass (UP-002A) retaining wall, limiting the number of lanes joining the M2 from York Street to two.

Once the remainder of the embankment is in place, works would also include the completion of the new York Street to M2 slip road (Link No. 15) as necessary to complement the new embankment levels.

The proposed traffic management layout would also provide space for the completion of works to construct the new vertical concrete step barrier in the central reserve of the Westlink (VCSB-001). The works would be facilitated by the prior widening of North Queen Street Bridge, with lanes realigned to the northern and southern extents of the widened structure accordingly. In light of the temporary realignment of the lanes, it is proposed to close the north-facing on and off-slips at Clifton Street for the duration of these works.

Based on the developed construction programme, it is expected that these works would require a minimum of 5 weeks to complete.

4.7.1.1.9 Phase 9

Phase 9 is illustrated on Figure 4.5 (Sheet 9).

With the embankments to the north (EB-005) and south (EB-003) of the proposed bridges at York Street completed, works would then commence to construct the remainder of the bridges and the infill section of embankment (EB-004) between the bridges, supported by retaining walls RW-032 and RW-034.

York Street would again be realigned to a new temporary position east of the future bridges, however, with the completion of EB-003 and EB-005, the route would require vertical realignment as necessary between the embankments.

The movement from Westlink to the M2 would be realigned to the new off-slip from Westlink to York Street, with a temporary signalised junction proposed to provide onward connection to the new slip road from York Street to the M2. In conjunction with these works, the new signalised junction at Cityside Retail Park and Galway House would be constructed, along with works to narrow the eastern footway of York Street between Galway House and Dock Street.

Based on the developed construction programme, it is expected that these works would require a minimum of 11 weeks to complete.

4.7.1.1.10 Phase 10

Phase 10 is illustrated on Figure 4.5 (Sheet 10).

With the new bridges BR-002A and BR-002B at York Street completed, traffic would be relocated to run over the new structure, with movements to and from the Westlink facilitated by temporary junctions at the northern and southern extents of the bridges, with temporary realignment of lanes as appropriate. The new retaining wall RW-028 at the Great George's Street car park would be constructed at this time. At Cityside Retail Park, the construction of the new signalised junction arrangements on York Street would continue, along with the construction of other traffic islands included within the permanent works.

The grade-separation provided by the new bridges would then allow works to commence on the excavation and construction of the new underpass structures, principally structures UP-001A, UP-002A and UP-002B. The construction of underpasses UP-002A and UP-002B would be a higher priority than the remainder of UP-001A, so that the works to complete the retaining walls between UP-002A and UP-001A can be completed in the next traffic management phase.

At this time, works would be undertaken on the southern section of Nelson Street and at the junction of Great Patrick Street and Dunbar Link to construct the new junction arrangement. Works required to reduce carriageway width on Nelson Street between Great George's Street and Great Patrick Street would also be undertaken at this time.

Based on the developed construction programme, it is expected that these works would require a minimum of 16 weeks to complete.

4.7.1.1.11 Phase 11

Phase 11 is illustrated on Figure 4.5 (Sheet 11).

Once the new underpasses from Westlink to M2 and M3 (UP-002A and UP-002B respectively) are completed, the traffic management layout would switch to that shown as Phase 11. It should be noted that, under this phase, two lanes would be provided for the movement from Westlink to M3, subject to signal control at a temporary signalised junction with Nelson Street.

The removal of M2 and M3 bound traffic from the junction to the north of the York Street Bridge (BR-002B) would permit the completion of the final junction arrangement for the Westlink to York Street slip road. On the southern section of York Street, works would commence to construct the traffic islands at the junctions with Little Patrick Street and Great Patrick Street, requiring the reduction in the number of lanes to three, opening to four where possible. Lane closures would also be required on Great Patrick Street to facilitate these works.

The construction of the M2 to Westlink underpass (UP-001A) would continue under this phase, including the construction of the proposed pumping station. During this phase, works would also commence on construction of the adjoining M3 to Westlink underpass (UP-001B) and the final tie-in between the two underpasses to the west of the York Street Bridge (BR-002A).

The opportunity would also be taken at this time to commence construction of the left-in / left-out arrangement on the M3 to York Street slip road, using lane closures as required on the southern section of Nelson Street.

Based on the developed construction programme, it is expected that these works would require a minimum of 12 weeks to complete.

4.7.1.1.12 Phase 12

Phase 12 is illustrated on Figure 4.5 (Sheet 12).

With the M2 to Westlink underpass UP-001A complete, the proposed new bridge at Dock Street (BR-004) would be opened to allow traffic to use the new underpass. At this time, works would then focus on completion of the M3 to Westlink underpass (UP-001B), with the final section at the Dargan Bridge to be completed. In the meantime, Westlink bound traffic from the M3 would continue through a temporary junction to the south of York Street Bridge (BR-002A), with an additional temporary signalised junction arrangement where traffic flows meet with those joining the Westlink from the M2 in underpass UP-001A.

With the opening of the proposed new bridge at Dock Street (BR-004), the opportunity would be taken to construct the new slip road arrangement from Dock Street to the M3 (Link No. 6) which would require the removal of the disused Nelson Street off-slip from the M2 and the closure of access to Nelson Street from Dock Street. Works would include the construction of associated flood walls RW-025 and RW-026.

Construction of RW-026 would be completed from the M3 on-slip, with temporary excavation of the existing M3 on-slip embankment to form a suitable working platform for its construction. The temporary works required would result in the reduction in lanes on the Westlink to M3 slip road to a single lane, albeit without signal control due to the removal of conflicting flows on Nelson Street. It should be noted that this temporary arrangement would be reflective of the final layout.

In parallel with these works, the opportunity would be taken to complete the construction of the pumped drainage outfall route and associated shafts, with the pumping station and associated access road under Corporation Street completed.

Temporary traffic management would also be required on the southern section of York Street to continue with construction of the final traffic islands and junction layout with the M3 off-slip (Link No. 7) requiring lane closures in turn on Great Patrick Street.

Based on the developed construction programme, it is expected that these works would require a minimum of 8 weeks to complete.

4.7.1.1.13 Phase 13

Phase 13 is illustrated on Figure 4.5 (Sheet 13).

At this stage, the majority of the permanent works elements would be completed, with the exception of the M3 to York Street off-slip (Link No. 7). Once the M3 to Westlink underpass (UP-001B) is completed, the underpass would open and provide a new grade-separated connection to the Westlink in a free-flow manner. This would then create the opportunity to construct the final off-slip arrangement from the M3 to York Street and complete associated embankment works to the west of York Street Bridge (BR-002A).

With the construction of retaining wall RW-026 and the new slip road from Dock Street to the M3 (Link No. 6) complete, the lanes would be realigned to their final layout, providing the opportunity to construct the flood wall RW-027.

Final works to finish the southern section of York Street would be completed during this phase, with associated closures on Great Patrick Street.

Based on the developed construction programme, it is expected that these works would require a minimum of 6 weeks to complete, at which point all elements of the permanent works would be completed and the scheme completed.

4.7.1.2 Temporary Speed Limits

Due to the layout of the proposed temporary traffic management arrangements and the proximity to several ongoing live work zones, it is proposed to implement a blanket 30mph temporary speed limit throughout the works, complemented with a buffer 50mph zone on the M2 foreshore citybound carriageway. The proposed 50mph buffer zone reflects the proposal, as part of the scheme, to introduce a permanent 50mph speed limit on the citybound carriageway on approach to the interchange to regulate vehicle speeds.

The proposed temporary speed limits on the M2 foreshore section would be subject to further review as part of detailed design development.

4.7.1.3 Existing Car Parking Facilities

It should be noted that all public car parks affected by the works, i.e. the Northside Park & Ride car parks, the Great George's Street (Lancaster Street) car park, and the Corporation Street car park would be closed from the onset of the construction period.

4.7.2 Construction Programme

It is anticipated that the scheme would require a minimum period of just over 3 years to complete, subject to the advance completion of service diversion works or advance placement of service diversion Orders with the relevant utility providers.

In line with government policy, the proposed form of contract would be the New Engineering Contract (NEC3). Under the provisions of this form of contract, the Contractor and Client are encouraged to manage risks and opportunities to the construction programme and construction cost in a partnering approach. Therefore, whilst opportunities may arise to enable early completion of the scheme, it must also be noted that, conversely, unforeseeable issues may arise during construction that may require the extension of the overall construction period.

4.7.3 Environmental Management Plan

Interim Advice Note (IAN) 183/14 of the Highways Agency provides guidance on the preparation and implementation of Environmental Management Plans (EMPs) for major motorway and trunk road projects.

The preparation and implementation of an EMP is widely considered to be best practice (by statutory and non-statutory bodies) to manage the environmental effects of their projects and to demonstrate compliance with environmental legislation. DMRB Volume 11, Section 2, Part 5 outlines the reason why mitigation needs to be managed throughout the various stages and DMRB Volume 11, Section 2, Part 6 recommends that an Environmental Management Plan is prepared and is part of any environmental assessment, whether statutory or non-statutory.

The EMP provides the framework for recording environmental risks, commitments and other environmental constraints, and clearly identifies the structures and processes that will be used to manage and control these aspects. The EMP also seeks to ensure compliance with relevant environmental legislation, government policy objectives and scheme-specific environmental objectives. It also provides the mechanism for monitoring, reviewing and auditing environmental performance and compliance.

4.7.3.1 Purpose of an Environmental Management Plan

The key aims of an EMP are to:

- act as a continuous link and main reference document for environmental issues between the design, construction and the maintenance and operation stages of the Proposed Scheme;
- demonstrate how construction activities and supporting design shall properly integrate the requirements of environmental legislation, policy, good practice, and those of the environmental regulatory authorities and third parties;
- record environmental risks and identify how they will be managed during the construction period;

- record the objectives, commitments and mitigation measures to be implemented together with programme and date of achievement;
- identify the key staff structures and responsibilities associated with the delivery of the project and environmental control and communication and training requirements as necessary;
- describe the contractor's proposals for ensuring that the requirements of the environmental design are achieved, or are in the process of being achieved, during the Contract Period;
- act as a vehicle for transferring key environmental information at handover to the body responsible for operational management. This shall include details of the asset, short and long-term management requirements, and any monitoring or other environmental commitments; and
- provide a review, monitoring and audit mechanism to determine effectiveness of, and compliance with, environmental control measures and how any necessary corrective action shall take place.

4.7.3.2 Scope of an Environmental Management Plan

An EMP considers the following subject areas, as appropriate:

- Environmental Management Procedures;
- Working Hours;
- Water;
- Air Quality;
- Noise and Vibration;
- Materials;
- Geology and Soils;
- Landscape;
- Nature Conservation;
- Cultural Heritage;
- Waste; and
- People and Communities.

4.7.3.3 York Street Interchange Environmental Management Plan

In line with the guidance contained within Interim Advice Note 183/14, an EMP has been prepared for the Proposed Scheme and is contained within Appendix 4 of this ES.

This EMP forms an outline plan and is closely aligned with the design and assessment process contained within Part II of this ES (Chapters 7 to 17). This outline EMP shall be further refined and expanded by the appointed Contractor into a Construction Environmental

Management Plan (CEMP) as more information becomes available and there is more certainty in terms of the proposed layout, construction methods, programme and the likely environmental effects.

Towards the end of the construction phase, the CEMP shall be further refined by the appointed Contractor into a Handover Environmental Management Plan (HEMP), which shall contain essential environmental information needed by the bodies responsible for the future maintenance and operation of the asset.

With this purpose in mind, it therefore follows that the outline EMP for the Proposed Scheme should be treated as a “live” document throughout the project lifecycle, requiring regular review and update as necessary.

5. EXISTING CONDITIONS

5.1 Environmental Conditions

The study area is centred on the interface between North Belfast, the northern fringe of Belfast City Centre and Belfast Harbour (Sailortown/Greater Clarendon), and is dominated by Dargan Bridge and the main arterial road routes that link the south of the City (Westlink), the east (M3 Lagan Bridge), the north (M2) and Belfast City Centre with North Belfast (York Street). The major strategic road junction and railway, developed between the mid-1960s and 1990s, separates the harbour area (Greater Clarendon) to the east, commercial and residential properties to the north and west, and the City Centre to the south from each other. As detailed within the Belfast Metropolitan Area Plan (BMAP) 2015, the area bounded by York Street, Westlink, the elevated M3 Lagan and Dargan bridges, the M2 and Dunbar Link has essentially disconnected these areas from each other, contributing to widespread blight, leaving many sites either vacant or under used.

The study area is set within an exclusively urban setting. Belfast City itself lies at the head of Belfast Lough, flanked by the gentle slopes of the Castlereagh and Holywood Hills to the east, and the basalt escarpment of the Antrim Plateau to the north-west, which constrain the growth of the City. Significant private and public investment has led to considerable urban renewal, improved infrastructure and significant new urban housing over the past thirty years, with the Waterfront and Laganside areas particularly benefiting from this regeneration and more recently the Titanic Quarter.

Belfast is the capital city of Northern Ireland, and largest hub on the regional transport system. The city occupies a strategic location on a number of Key Transport Corridors (KTCs), serving as a regional gateway with important links to other European cities. The railway services for Northern Ireland and cross-border link to Dublin are served from Belfast, via Central and Great Victoria Street stations. The Belfast area has good road connections with other main centres of population throughout the Province, with a number of main routes radiating from the City.

5.1.1 *Historical*

With reference to BMAP, the origins of Belfast can be traced to the early 13th Century, where a small settlement originated at the mouth of the River Lagan. This settlement began to develop as a market place and port during the 17th and 18th Centuries, with development of the manufacturing industry increasing growth of the settlement towards the end of the 19th and beginning of the 20th Centuries. Belfast was granted city status by Queen Victoria in 1888. Principal industries at this time were linen, shipbuilding, tobacco and heavy engineering. Belfast prospered and by 1901 was the largest city in Ireland, with one of the largest shipyards in the world.

Whilst the character of the study area is currently dominated by the impacts of a modern transportation network, character is also defined by a strong link to Belfast's industrial past which still bears a significant mark on the urban fabric. The early development of the study area owes itself to the Industrial Revolution when the city expanded northwards as a consequence of the developing docklands. New streets were built in the area at this time, with names such as Pilot, Trafalgar, Nelson and Dock Street, giving a broad indication of the significance of this area in relation to its maritime heritage. The connection to the maritime past remains to this day, with buildings such as St Joseph's Church (built in 1881 and at one time sat in the heart of the Sailortown community), Sinclair Seamen's Church (built in 1853) and The Harbour Commissioners Office (built in 1854) reflecting the historic use of the area and the connection to the docklands. All of the aforementioned buildings are architecturally listed; however the most significant of these is The Harbour Commissioners Office situated in

Corporation Square, where Belfast's shipbuilding industry grew from, and is still the home of the Belfast Harbour Commissioners.

The character of the study area is also defined by one of Belfast's oldest surviving pieces of maritime heritage, Clarendon Dry Dock, which is in working order and is still operated by the same Victorian engineering design features. Built on the site of the city's first shipyard, Clarendon Dry Dock No. 1 was completed in 1800, followed in 1826 by Clarendon Dry Dock No. 2. At the time of completion in 1826, the port handled 210,000 tonnes of cargo.

Due to the expanding docklands and industrial development, Belfast became the fastest growing urban centre in the United Kingdom, with its population rapidly increasing from 19,000 in 1801 to well over 70,000 by 1841. York Street has been a main thoroughfare of Belfast since the early 19th Century, developing from a residential district into an industrial zone, once home to two industrial enterprises that were the largest of their kind in the world; Mulholland's York Street Mill and Gallaher's Tobacco Factory. The linen mill was founded in the early 19th Century by Thomas Mulholland and his sons, and the tobacco factory founded in 1867 by Thomas Gallaher, both contributing greatly to the surge of people into this area. At the time, York Street was also a main shopping area and another notable York Street establishment was the foundry of John Rowan & Son.

5.1.2 **Belfast Lough**

Belfast Lough, located approximately 1.5km north-east of the study area is a semi-closed sea lough, the inner region containing an inter-tidal area comprising a series of mudflats, with the outer area containing mainly rocky shores, with some sandy bays. The mudflats provide a valuable habitat for a range of bird species and the shallow waters on either side of the main shipping channel (which runs through the middle of the lough) sustain a growing shellfish industry.

Whilst there are no designated sites of ecological or nature conservation interest within the immediate study area, the lough is protected by multiple national and international designations. The shoreline of mudflats, sandy bays and rocky shores are designated as an Area of Special Scientific Interest (ASSI), a Ramsar site, and a Special Protection Area (SPA). The open water portion of the lough is designated separately as a SPA. The ASSI designations consist of two separate sites; Inner Belfast Lough ASSI and Outer Belfast Lough ASSI.

5.1.3 **Belfast Harbour**

From Lagan Weir, the River Lagan flows into the fully tidal Belfast Harbour, before flowing into Belfast Lough. Belfast Harbour has a water body area of approximately 3.44km². In terms of its characteristics, it is classified as euhaline (waters containing between 30 and 40 parts per thousand of dissolved salts; that is, in most cases, normal sea water), mesotidal (moderate tidal range, normally of between 2 and 4m) and in terms of exposure, it is sheltered. This area also contains Belfast Harbour Estate (approximately 809ha (2000 acres)) which is the busiest passenger port in Northern Ireland and handles approximately 60% of Northern Ireland's sea-borne trade. George Best Belfast City Airport is also situated within the Estate.

Belfast Harbour is Northern Ireland's principal maritime gateway and logistics hub, serving the Northern Ireland economy and increasingly that of the Republic of Ireland. With reference to the Belfast Harbour – Port Master Plan, Belfast Harbour plays an essential role in the local economy of Belfast and regional economy of Northern Ireland. The Northern Ireland economy is largely dependent on sea-borne trade and Belfast Harbour handles 60% of this trade and 20% for the island of Ireland. The Harbour Estate is home to over 650 businesses, employing circa 17,000 people.

Belfast Harbour is Northern Ireland's only multi-modal port, operating in all five of the traditional port trade sectors: Containers, also known as 'Lift-on / Lift-off' (LoLo); Ferries, also known as 'Roll-on/ Roll-off' (RoRo); Liquid Bulk, which includes oil and chemicals; Dry Bulk, which includes commodities such as grain and coal; and Break Bulk, which includes commodities such as timber, paper and steel.

5.1.4 **George Best Belfast City Airport**

George Best Belfast City Airport is a regional airport serving a range of destinations, mainly in Great Britain, though it does provide services to mainland Europe. Situated on the south shore of Belfast Lough adjacent to the A2 Sydenham bypass (one of the main arterial routes into the city), the airport has grown significantly in recent years and is a key strategic gateway to the province.

5.1.5 **Local Context**

Located at the southern end of one of the main arterial routes (York Street/York Road/Shore Road) in Belfast, the study area is centred on the northern fringe of the City Centre. The area is very much a degraded urban landscape; however, has attributes and features reflective of the ever-changing face of Belfast, from the Industrial Revolution through to contemporary 21st Century developments.

At the core of the study area, the main characteristic is its legacy of 20th Century transport planning which has changed the urban fabric, to achieve not only easier traffic movements around the periphery of the City, but to essentially act as one of the primary road transportation hubs for the province, providing a northern gateway to the City. The area is dominated by large-scale physical infrastructure features, such as the Lagan and Dargan bridges which have caused a certain degree of severance. Also part of this transportation legacy, is the Westlink which due to its at-grade intersection with York Street between the M2 and M3, disrupts the continuity of this arterial route. Much of the land in the core of the study area is either brownfield or currently in use as surface level car parking. Within the confines and immediate surrounds of the existing junction arrangement, there is very little built development. Whilst this land has been developed in the past, very little currently remains, other than a vehicle mechanics on Shipbuoy Street.

Beyond the immediate surrounds of the existing junction arrangement, there is a distinct variation in land use and associated built development. To the west, high density residential housing occupies land north and south of the Westlink.

To the south, existing built development is dominated by commercial properties, becoming progressively more built-up away from the junction and closer to the City. Recent developments, such as St Anne's Square (adjacent to St Anne's Cathedral) provide a mixed-use area of restaurants, apartments, hotels and arts venues (The MAC). The Interpoint building has recently been demolished and work is on-going at the site as part of the University of Ulster – Greater Belfast Development. The Obel Tower is located adjacent to the M3 at Donegall Quay, and is currently the tallest residential building in Ireland. It has a mix of residential and office properties within it.

To the east, built development is dominated by residential and mixed use office developments, primarily associated with the regeneration area at Clarendon Dock. Regeneration in this area is continuing, with a major mixed-use development at a significant urban regeneration site known as 'City Quays' in the Clarendon Dock area of Belfast Harbour proposed. Currently, Phase 1 of this development (erection of office building, surface car parking and other associated works at vacant land at Clarendon Dock) is undergoing construction.

To the north, built development is primarily dominated by commercial properties ribboning along York Street, most notably Cityside Retail Park at Yorkgate. The periphery of the study area is also very much reflective of the ever changing face of the Belfast urban fabric, providing not only evidence of previous historical land uses, but also how buildings and sites with strong historical links to Belfast's industrial past (in particular shipbuilding) still contribute significantly to character, cultural heritage, and to continued development through their current and potential future uses.

Acting as a primary road transportation hub, the volume of traffic passing through and beyond the York Street area when compared to the wider provincial road network is very high, so much so that vehicular movements throughout the wider strategic road network have resulted in Air Quality Management Areas (AQMAs) being declared by Belfast City Council. On the western periphery of the study area, Belfast AQMA No.1 has been declared along the M1 and Westlink Corridor.

The natural topography within the study area is relatively flat, given its proximity to sea level, with typical levels at York Street junction being approximately 2.0m Above Ordnance Datum (AOD). The M2 is elevated to a level of approximately 10.0m AOD, approximately 8.0m above the surrounding streets from Dock Street underbridge and increases to tie-in with the Lagan Bridge and Dargan Bridge, which are elevated to approximately 12.0m AOD.

The topography of the study area is such that it generally drains in an easterly direction (i.e. from the Westlink towards Belfast Harbour). Based on information received from NI Water, Rivers Agency and Transport NI, the existing drainage regime associated with the York Street study area consists of a network of road gullies and pipes collecting runoff from carriageways and adjacent areas. Primarily, runoff from the existing road network outfalls by gravity to the existing combined storm and foul water sewers (which are generally owned and maintained by NI Water). The exceptions to this are a section of elevated M3 between the Lagan Bridge and Nelson Street, which drains into Belfast Harbour via a NI Water combined storm water/foul water overflow culvert (though this culvert no longer conveys foul water), and an area of the existing M2 motorway (north of Dock Street), which drains to the Mile Water culvert before discharging into Pollock Dock.

5.1.6 **Industry**

Belfast currently has a broad base of service industries, which provide the main employment opportunities within the city. The manufacturing industry within the city has declined in significance in recent years, with reduced employment opportunities within this sector. Key employers within Belfast include Bombardier Aerospace, Queens University, and the Belfast Health & Social Care Trust.

As mentioned previously, the study area has a strong industrial heritage, based around traditional industries such as shipbuilding, tobacco and heavy engineering, but while these industries have suffered decline from an increasingly competitive international market, the area has adapted and changed with the times. This is particularly reflected in restoration of the Clarendon Dock area in 1993 into one of Northern Ireland's most prestigious business parks, currently housing offices and apartments and is home to a range of national and international companies. The redevelopment of the Clarendon Dock area is still ongoing and major development proposals (i.e. City Quays) in the planning and construction process. This is a city centre designated mixed-use regeneration project in the heart of Belfast and is an extension to the already fully occupied Clarendon office and residential scheme. The project will benefit from over half a mile of water frontage and extensive open space, and will reconnect the Harbour to the City Centre.

Although the study area has seen significant changes in the type of industry providing the main employment base, it has remained a focal retail centre. Of particular significance is the Cityside Retail Park (formerly Yorkgate) which is a major employer and important retail, service and district centre for the surrounding area. Of particular significance is the link to the industrial past, as the expansive site of the retail park was once home to York Street Mill and Gallaher's Tobacco Factory. Yorkgate Business Park is situated on a thin strip of land between the M2 and York Street, opposite the Cityside Retail Park. Phase I (Galway House) was completed in January 2007 at a cost of £2M, providing retail space on the ground floors and office space above.

5.1.7 *Climate*

Information quoted within this sub-section is reproduced from the Met Office's climate summary for Northern Ireland, based on its records from the years 1971 to 2000.

In general, Northern Ireland is cloudier than the rest of the United Kingdom, because of the hilly nature of the terrain and the proximity to the Atlantic Ocean. Even so, the coastal strip of County Down has an annual average total of over 1,400 hours of sunshine. The dullest parts of Northern Ireland are the more mountainous areas of the north and west, with annual average totals of less than 1,100 hours. Mean daily sunshine figures reach a maximum in May or June, and are at their lowest in December. The key factor is the variation in day length through the year, but wind and cloud are major controlling factors as well. Annual mean sunshine duration for the area would typically be between 1,250 and 1,300 hours.

Rainfall in Northern Ireland varies widely, with the highest average annual totals being recorded in the Sperrin, Antrim and Mourne Mountains, where the annual precipitation is approximately 1,600mm. Proximity to the Atlantic Ocean and the prevailing south-westerly low pressure systems are the cause of the comparatively high rainfall figures experienced in the west of the Province of up to 1,950mm of rainfall per annum, compared with just less than 800mm of rainfall per annum to the south of Lough Neagh and the east of the Province.

Seasonal rainfall variation in Northern Ireland is not large, but the wettest months are between October and January. This is partly a reflection of the relatively low frequency of thunderstorms in the Province and the high frequency of winter Atlantic depressions.

The occurrence of snow is closely linked to temperature and altitude, being comparatively rare near sea level but much more frequent over the hills. The average number of days when snow falls varies between 10 near the east coast to over 35 in the mountains of Sperrin, Antrim and Mourne. The number of days on which snow lies varies from less than 5 days around the coast to over 30 days in the mountains. On rare occasions, the snow has lain in excess of 30 days or indeed caused travel disruption for up to 5 days.

Throughout Northern Ireland, mean annual temperature varies little at low altitudes, averaging between 8.5°C to 9.5°C with the higher mean values occurring nearer to the coasts. As would be expected, the lowest mean annual temperatures are recorded with increasing height, therefore Slieve Donard (Northern Ireland's highest mountain) would have an average annual temperature of about 4.5°C. Due to the influences of the surrounding sea, Northern Ireland's winter temperatures are relatively mild, therefore inland areas generally experience colder temperatures than the coast, with the opposite being the case in the summer months. On average, the area can expect a mean annual temperature of 8.5°C to 9.5°C.

Inland, generally January or February are the coldest months of the year with mean daily minimum temperatures being between 0.5°C in upland areas and about 2.0°C on the coast. July is the warmest month with the mean daily maximum temperatures being between 17.0°C in upland areas to almost 20.0°C.

In general, wind speed increases with height with the strongest winds being recorded over the summits of hills and mountains. The coastal fringes of County Antrim and Down have about 15 gales per year, while the number of days decreases inland to five days or fewer. These are associated with the passage of deep depressions across or close to the British Isles and most frequently occurring in the winter months. In comparison with the rest of the British Isles, the frequency of gales experienced in Northern Ireland is relatively low due to the shielding effect that the rest of Ireland and some parts of Scotland has on decreasing wind speed.

6. CONSULTATIONS

6.1 Introduction

It was acknowledged that a key objective for Transport NI in the '*Agency Communications Strategy 2005-2007*' was the need to develop Good Practice Communications Guidelines for Major Projects. This recommended a need for all major projects to have their own communications strategy developed around key stakeholders, associated messages, and the medium in which these should be delivered.

Following on from publication of the strategy, Transport NI developed the '*Communications Guidelines for Major Works Projects*' document, setting out key stakeholders and actions that need to be considered at each stage of a communications strategy for major road improvement projects.

As part of the scheme development process, a Communications Plan (Volume 2: Appendix 6, Annex A) was developed which enabled the Project Team to consider communication mechanisms needed to successfully complete the scheme, help establish expectations of proactive communication between team members, and document what the team agrees to do. The Communications Plan not only made it clear to the Project Team how the scheme communications would work, it also informed people outside the Project Team as to what to expect. The Communications Plan has been developed in line with Transport NI's Communications '*Guidelines for Major Works Projects*', which sets out key stakeholders and actions that need to be considered at each stage of a communications strategy for major road improvement projects.

As set out in the Communications Plan, the main aim of the consultation process was to ensure that there is effective communication with key stakeholders and other interested parties as the scheme development progressed. This plan identified a programme of consultation with a range of key stakeholders (statutory and non-statutory bodies) as part of the DMRB Stage 3 Scheme Assessment process. From this, a standalone Stage 3 Consultation Plan, which is included as Appendix D of the Communications Plan was developed that explained how and when stakeholders would be consulted in advance of the '*Orders Exhibition*' to coincide with the publication of the ES, the Notice of Intention to Make a Designation Order (NIMDO) and the Notice of Intention to Make a Vesting Order (NIMVO).

6.2 Stakeholder Engagement

Stakeholders are engaged in defining assessment activities. Statutory environmental bodies, local authorities, other public authorities with environmental responsibilities, and other key stakeholders are likely to have views on the scope of environmental impact assessment, and it is good practice, particularly in the case of EIA, to consult with these groups to ensure that the issues are appropriately addressed in the evolving scheme design and indeed the ES itself.

Any dialogue should be directed towards establishing:

- whether and where there are existing resources or receptors that may need further investigation;
- whether existing environmental problems occur in the locality that may be ameliorated or potentially made worse by the proposed project;
- whether opportunities exist to improve environmental conditions which may coincide with delivery of the project;

- whether any trends or intermittent events occur that would be of relevance to the assessment, such as seasonal flooding or an activity occurring under some circumstances such as a large public event, diverted traffic, exceptional loads; and
- forthcoming events, activities, developments and land use changes that may have a bearing upon the future state of the environment.

6.3 Previous Stakeholder Consultations

6.3.1 Stage 1 Scheme Assessment

The Stage 1 assessment initially considered a number of alternative schemes, including public transport and road and traffic measures. However, in the case of all alternative schemes, it was identified that the scheme objectives could not be met through such measures alone without removing the bottleneck at the existing York Street signalised junction. Accordingly, a number of grade-separated junction options were developed and assessed.

To establish relevant environmental constraints and factors that should be taken into account when considering the junction options, stakeholder consultation was undertaken in May 2008. The responses received identified a variety of environmental issues and constraints, which contributed to the overall assessment process and ultimately towards the shortlisting of four of the identified six Preliminary Options as options to provide full or partial grade-separation. Furthermore, the consultation also contributed to the identification of other stakeholders with an interest in the Proposed Scheme.

6.3.2 Stage 2 Scheme Assessment

Following publication of the Preliminary Options Report in March 2009, the junction options were issued on four separate drawings to various statutory and non-statutory consultees in April 2011 to update information previously received and to seek new information on relevant environmental constraints and factors that should be taken into account when considering selection of a Preferred Option.

Each stakeholder was also notified of the Public Consultation event for the scheme, which was held on 1st and 2nd June 2011 at the Ramada Encore Hotel in Belfast.

6.3.3 Stage 3 Scheme Assessment

An integral element of the Stage 3 environmental assessment includes consultation with statutory authorities and other interested bodies to establish any relevant constraints or factors to be taken into account when considering the Proposed Option. As noted above, all statutory consultations undertaken to date have been in accordance with the Communications Plan which is in line with Transport NI's brief for the York Street Interchange scheme and their '*Communications Guidelines for Major Works Projects*' document and '*Good Practice Communications Guide*'.

The objectives of the Stage 3 - Statutory Procedures consultation from these guidelines includes:

1. formal notification of the scheme;
2. update the relevant stakeholders;
3. inform relevant stakeholders of the design and Statutory Procedures process; and
4. provide opportunity to submit representation, including objections.

The EIA process looks at the effects of the Proposed Scheme on the environment, in consultation with external bodies to inform the design and decision making. The Stage 3 EIA consultation commenced in February 2014 to allow relevant interested bodies an opportunity to register concerns or particular requirements during the EIA process, consult on the levels of assessment necessary, and seek input to the ES. However a number of bodies did not respond to the first consultation phase and were subsequently reminded to do so in April 2014, before closing the consultation period at the end of that month. For some of the bodies consulted again, the second consultation phase still did not yield a response. Furthermore, as the design progressed and more information became available about other parties that may have an interest in the Proposed Scheme, these too were consulted over the course of the assessment.

Of those bodies which did respond, the majority of comments were received via letter, email or telephone conversation, however for some bodies with a particular interest in the Study Area/Proposed Scheme, formal meetings also took place.

The comments and views obtained from the consultees have subsequently been used to identify baseline conditions over the area, and considered in the decision making process. Where possible, the comments obtained have been used to refine the Proposed Option and to form mitigation proposals to minimise scheme effects. Details of consultee responses are discussed as appropriate under each relevant technical section in Chapters 8 - 17 and are included in Appendix 6, Annex B.

The following bodies were consulted over the course of the Stage 3 EIA for the Proposed Scheme:

- Belfast City Council - Chief Executive's Department;
- Belfast City Council - Development Department;
- Belfast City Council - Health & Environmental Services Department;
- Belfast City Council - Parks & Leisure Department;
- Belfast Education & Library Board;
- Department for Regional Development - Cycling Unit;
- Department for Social Development – Belfast City Centre Regeneration Directorate;
- Department of Agriculture and Rural Development – Countryside Management Branch;
- Department of Culture, Arts and Leisure – Inland Fisheries Group;
- Department of Enterprise, Trade and Investment - Geological Survey of Northern Ireland;
- Department of the Environment - Air & Environmental Quality Unit;
- Department of the Environment - Planning and Local Government (Belfast Metropolitan Area Plan Team);
- Department of the Environment - Planning and Local Government (Divisional Planning);
- Department of the Environment - Planning and Local Government (Tree Preservation Orders);

- Department of the Environment - Strategic Planning Division (Minerals Development, Management & Compliance);
- Depaul Ireland (Stella Maris);
- National Trust;
- Northern Ireland Bat Group;
- Northern Ireland Environment Agency - Built Heritage (Historic Buildings Unit);
- Northern Ireland Environment Agency - Built Heritage (Historic Monuments Unit);
- Northern Ireland Environment Agency – Environmental Protection (Industrial Pollution and Radiochemical Inspectorate);
- Northern Ireland Environment Agency - Environmental Protection (Marine Assessment and Licensing Team);
- Northern Ireland Environment Agency - Environmental Protection (Waste Management Unit);
- Northern Ireland Environment Agency - Environmental Protection (Water Management Unit);
- Northern Ireland Environment Agency - Environmental Protection (Conservation, Designations & Protection);
- Northern Ireland Environment Agency - Natural Heritage (Development Management Team);
- Northern Ireland Tourist Board;
- Royal Society for the Protection of Birds;
- Statutory Advisory Councils to the Department of the Environment;
- Sustrans Northern Ireland;
- Ulster Angling Federation;
- Ulster Wildlife Trust;
- Wildfowl & Wetlands Trust; and
- Woodland Trust.

The Communications Plan also identified a range of key stakeholders for consultation as part of the general Stage 3 Scheme Assessment process, not specifically as part of the EIA process. Various forms of communication were utilised as part of this consultation including letters, meetings and presentations. Some of the responses received from these stakeholders included information of relevance to the ES, and as such have been considered within the EIA as necessary and where allowable (i.e. when not breaching confidentiality). Stakeholders engaged as part of the general Stage 3 Scheme Assessment who provided information of relevance to the EIA included:

- Belfast Harbour Commissioners;
- Department of Agriculture and Rural Development – Rivers Agency;
- Department for Social Development - Housing Division;
- Forum for Alternative Belfast;
- Helm Housing;
- Northern Ireland Housing Executive;
- Northern Ireland Water;
- PSNI – Crime Prevention Unit;
- PSNI – Traffic Management Unit;
- Translink; and
- Various Affected Landowners.

6.4 Public Consultation

Transport NI recognises the importance of community involvement in its activities and decision-making and is committed to upholding its responsibilities in an open, consultative and inclusive manner. Community Information Events provide an improved understanding of the community's view, as an essential counterbalance to quantitative influences on decision making; allows an opportunity for different views to be expressed and taken into account in decision-making; and ensure the study processes and decision-making are open and clearly understood by all.

Key objectives of undertaking community and stakeholder involvement are:

- to ensure communities and other stakeholders are provided with sufficient, timely information about the scheme;
- to ensure decision-making is inclusive of diverse community ideas and opinions;
- to ensure planning, development and delivery of the project meets the 'balance of community' needs and expectations;
- to enhance transparency and public accountability; and
- to build constructive and collaborative working relationships with communities and other stakeholders.

6.4.1 Public Consultation Event – June 2011

A two-day public consultation event was held on the 1st and 2nd June 2011 in the Ramada Encore Hotel in Belfast to launch a period of public consultation on the scheme options that ran from 1st June 2011 to 30th June 2011. Representatives from Transport NI and the Project Team, were present to answer questions and to provide assistance to members of the general public. Questionnaires were made available to the public as part of the public consultation event to provide an opportunity for the public to express their views on the four scheme

options. Alternatively, representations could be made by letter or email directly to Transport NI.

6.4.1.1 Advertisement of the Public Consultation Event

A press notice advertising the exhibition was placed in the following newspapers for two consecutive weeks (weeks commencing 16th and 23rd May 2011):

- Belfast Telegraph;
- Irish News;
- News Letter; and
- North Belfast News.

Copies of the notices are included in Volume 2: Appendix 6 – Annex C of this ES.

In the week commencing 16th May 2011, a fortnight prior to the consultation event, 16,750 flyers were distributed by Royal Mail to local residents and businesses, informing them of the upcoming event. A copy of the flyer and a map showing the flyer distribution area are included in Volume 2: Appendix 6, Annex C.

In addition to the Royal Mail leaflet distribution, the Project Team carried out an additional leaflet distribution to properties on Little George's Street on 17th May 2011 and Garmoye Street and Corporation Street, including adjacent side streets such as Pilot Street, Short Street and Corporation Square on 23rd May 2011. Transport NI also made available copies of the flyer in their Eastern Division offices and the local Section Office on Corporation Street.

As a further measure, a copy of the public consultation event flyer was made available on the DRD website.

6.4.1.2 Press Release and Press Briefing Pack

A press briefing pack was prepared in advance of the public consultation event, with several copies forwarded to the Department's Press Office for onward distribution to various media organisations. A Ministerial press release was prepared and included as part of this press pack to coincide with the launch of the public consultation event.

6.4.1.3 Public Information Leaflet

A public information leaflet was prepared in advance of the consultation event to illustrate the four options under consideration and outline progress to date. Copies of the leaflet were made available at the public consultation event, with an electronic copy made available on the DRD website. A copy of the leaflet is included in Volume 2: Appendix 6, Annex C of this ES.

6.4.1.4 Presentation to Invited Guests

A number of guests, including local politicians and representatives from the identified list of key stakeholders were invited to attend an advance presentation of the scheme options on the morning of Wednesday, 1st June from 10.00am, prior to opening of the exhibition to the public at 2.00pm. The list of guests invited to attend the presentation is included in Volume 2: Appendix 6, Annex C.

Guests were provided with a copy of the public information leaflet and given the opportunity to peruse the exhibition material prior to the launch of the public consultation event. The Minister

for Regional Development officially opened the consultation event with the Project Owner, and a subsequent presentation was delivered by the Project Sponsor and the URS Project Manager.

Following the presentation, a question and answer session was facilitated by the Project Owner, giving the assembled guests a chance to put questions to a panel formed by members of the Project Team.

6.4.1.5 Press Coverage

The public consultation event received considerable media coverage, with numerous spots on local television news programmes and in the local newspapers. Copies of some of the press clippings are included in Volume 2: Appendix 6, Annex C.

6.4.1.6 Public Exhibition

6.4.1.6.1 Duration and Registration

The public exhibition component of the consultation event was opened at 2.00pm on 1st June 2011 and ran until 9.00pm that day. On 2nd June 2011, the event was reopened at 10.00am and ran until 9.00pm. Visitors attending the exhibition were invited to register their attendance, with a total of 174 names entered over the two days.

6.4.1.6.2 Display Material

Within the exhibition, a series of display boards were placed for viewing containing written text, photographs and plans. Also in the room were two hi-definition televisions, displaying four high definition 3D models. Each screen alternated between two options. A touch screen interface was also available to offer visitors an interactive method of distinguishing the movements at the junction, in both the existing arrangement and the four proposed options. The exhibition material comprised a number of large display boards, entitled:

- Welcome to the Public Exhibition;
- The Need for the Scheme;
- Scheme Objectives;
- The Scheme Assessment Process;
- Summary of Progress to date;
- Option A (2No. Boards);
- Option B (2No. Boards);
- Option C (2No. Boards);
- Option D (2No. Boards); and
- Selection of Preferred Route.

Copies of the display boards are included in Volume 2: Appendix 6, Annex C.

Throughout the course of the consultation, visitors were encouraged to talk to the attending staff to discuss the options and to make known their views. The majority of visitors took up this

invitation and discussed matters at length. A selection of photographs from the exhibition is included in Volume 2: Appendix 6, Annex C.

6.4.1.6.3 Public Questionnaire

Visitors to the exhibition were provided with a copy of the public information leaflet on arrival and were invited to register their comments on a public questionnaire available from staff. Visitors had the option of completing the questionnaire and returning it at the event, or returning it by post to Transport NI before the close of the consultation window on 30th June 2011. Comments were also invited in electronic format, with an email address provided for the return of responses.

The questionnaire was designed on a 'tick-box' basis, so that it did not discourage people from filling in lengthy questionnaires and to assist in the subsequent analysis. It should be noted that several of the returned questionnaires were not completed in the manner intended. A copy of the questionnaire is included in Volume 2: Appendix 6, Annex C.

6.4.1.6.4 Key Findings from the Stage 2 Public Consultation

- Agreed need for road improvements between the strategic routes;
- Reducing traffic congestion considered the most important factor by the public in developing the scheme;
- Concerns over potential closure of slip roads at Clifton Street;
- Desire to see improvements for pedestrians and cyclists at the junction as part of the scheme;
- Concerns over community severance and impact on future development opportunities (particularly for Options B & D);
- Options delivering full grade-separation of strategic movements between Westlink, M2 and M3 preferred (i.e. Options B & C); and
- Option C the preferred option on basis of responses received.

6.4.2 Ministerial Announcement - December 2012

The Minister for Regional Development announced the Preferred Option for the interchange scheme at an event held on the 6th December 2012 in the Ramada Encore Hotel in Belfast. Following the announcement, Transport NI put information about the Preferred Option on display for the public on the ground floor of the Cityside Retail Park until the 17th December 2012.