Department for Infrastructure (DfI)

The Roads (Northern Ireland) Order 1993
The Local Government Act (Northern Ireland) 1972

A1 JUNCTIONS PHASE 2
PUBLIC INQUIRY
March 2020

Proof of Evidence:
Environmental Impact Assessment Report (EIAR)

By

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1 INTRODUCTION

1.1 Personal Details

1.1.1 My name is Raymond Holbeach, Planning & Environmental Director of RPS Consulting UK & Ireland appointed to assist Department for Infrastructure (DfI) Southern Division to deliver the A1 Junctions Phase 2 Project ("The proposed development"). I am a Chartered Landscape Architect of the UK Landscape Institute and a member of the Institute of Environmental Management and Assessment.

1.1.2 I have over 29 years of experience in public and private sector environmental consultancy works including out Environmental Impact Assessments (EIA) for major infrastructure projects particularly major road schemes. The assessments of major road schemes have included the preparation of Constraints Studies; Route Selection Reports; and Environmental Statements/Environmental Impact Assessment Reports (EIAR). This has included the environmental assessment of major road schemes such as; A4/A5 Dungannon to Ballygawley Dual Carriageway; A1/N1 Newry to Dundalk Link; A55 Knock Road Widening Scheme; N56 Glenties to Dungloe; and Manorcunningham – Lifford N13/14 Co. Donegal/Strabane Link.

1.2 Project Role

1.2.1 I have acted as Environmental Project Director and EIAR coordinator for the proposed development on behalf of the RPS-Sweco Consortium. As Environmental Project Director for I have been responsible for providing environmental guidance to the overall project team as well as the co-ordination of the environmental team in production of the published EIAR.

2 SCOPE OF EVIDENCE

2.1 My evidence covers the EIAR published in March 2019 and presents the findings and results of the EIAR.

2.2 My evidence summarises the EIAR chapters and I will address any matters arising at the inquiry however individual EIA specialists can be made available if necessary to assist in responses to detailed queries.

3 STRUCTURE OF ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

3.1 Environmental Impact Assessment (EIA) is the process of compiling, evaluating and presenting all the likely significant environmental effects of a proposed development. The need to undertake an assessment is governed by EC Directive 2011/92/EU as amended by Directive 2014/52/EU. These Directives have been implemented in Northern Ireland under the terms of the Roads (Northern Ireland) Order 1993 as amended by the Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 hereafter referred to as the EIA Regulations.

Under the EIA Regulations, there is a requirement for DfI to:

- Determine whether any proposed project falls within Annex I or Annex II of the EIA Directive; and
- Publish any EIA determination they make in respect of a roads project.

3.2 An Environmental Screening Report was prepared and published on the DfI Website (January 2018) in accordance with the legislative requirements. The Environmental Screening Report concluded that the proposed development falls under the category of Annex II of the Roads Order (NI) 1993 (as amended) and that the project should be subject to an EIA.

3.3 The structure of the published EIAR was set out as follows:

Volume I: Environmental Impact Assessment Report – Main Text

Volume II: Environmental Impact Assessment Report – Drawings and Figures

Volume III: Environmental Impact Assessment Report – Appendices

Non-Technical Summary (NTS)

3.4 The EIA Regulations outline the formal requirements for the content of the EIAR. The regulations state that an EIAR should include as a minimum:

A description of the project comprising information on the site, design, size and other relevant features of the project;

A description of the likely significant effects of the project on the environment;

A description of the features of the project and measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

A description of the reasonable alternatives studied by the Department which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;

A non-technical summary of the information referred to in the bullets points above; and

Any additional information relevant to the specific characteristics of the particular project or type of project and to the environmental features likely to be affected.

3.5 The published EIAR presents the results of the EIA to demonstrate how identified mitigating factors have been taken into account through the design evolution to ensure that the project is environmentally acceptable and sustainable. The chapters that are included in the EIAR are set out in Table 1.1.

Table 1.1 – Chapters of the EIAR

Chapter 1	Introduction
Chapter 2	Project Description
Chapter 3	Scoping
Chapter 4	Alternatives
Chapter 5	Policies & Plans
Chapter 6	Landscape & Visual
Chapter 7	Soils, Geology & Contaminated Land (including waste)
Chapter 8	Water Environment (including Flood Risk & Aquatic Ecology
Chapter 9	Biodiversity
Chapter 10	Air Quality
Chapter 11	Climate & Greenhouse Gases
Chapter 12	Noise & Vibration
Chapter 13	Traffic & Transportation
Chapter 14	Cultural Heritage
Chapter 15	Population & Human Health
Chapter 16	Land Use
Chapter 17	Pedestrians, Cyclists, Equestrians & Community Effects
Chapter 18	Material Assets
Chapter 19	Vehicle Travellers
Chapter 20	Interactions of the Foregoing and Cumulative Effects
Chapter 21	Schedule of Environmental Commitments

3.6 The format in Table 1.1 corresponds to the list of environmental topics specified in the EIA Regulations as set out in Table 1.2.

Table 1.2 – Compliance with EIA Regulation Topics

EIA Regulations Topic	Covered in the EIAR under
Population & Human Health	Pedestrians, Cyclists…., Land Use, Noise, Air
Biodiversity	Biodiversity, Water Environment
Land	Land Use, Soils and Geology
Soils	
Land Use, Soils & Geology	
Water	Water Environment, Soils and Geology
Air; Climate	Air, Climate and Green House Gases
Material Assets	Material Assets
Landscape	Landscape and Visual
Cultural Heritage	Cultural Heritage
Interactions	Interactions of the Foregoing
Major Accidents & Disasters	Scoped out

Vulnerability to Major Accidents and Disasters is a new EIA topic introduced as part of the new EIA Directive. The scoping exercise confirmed that this topic should be scoped out for this project on the basis that it is a retrofit to an existing road and therefore, no new vulnerability to major accidents or disasters are being introduced. If anything, on account of the project being a safety driven scheme, vulnerability to major accidents or disasters is likely to be reduced by the proposed development.

3.7 The methodology for undertaking the EIA process provides for a staged approach, which can be summarised as follows:

- Scoping / consultation exercise – to compile relevant background data and identify issues and constraints;
- Baseline surveys – including site walk-over surveys, detailed specialist surveys and discussions with relevant statutory and other consultees to determine the nature and extent of the existing environment;
- Identification of potential significant effects – predicting the likely significant environmental effects (direct, indirect, secondary and cumulative) of the proposed development during construction and operational phases as well as setting the scene for identifying appropriate mitigation for the development during construction and operational phases;
- Interactions of the foregoing and cumulative effects – predicting the likely significant effects of various environmental aspects in tandem from the proposed development and from the proposed development in tandem with other approved developments in the study area;
- Mitigation & Monitoring – description of mitigation proposals including those which have been incorporated into the project design as it evolves, including regular

review and evaluation, to mitigate the identified significant environmental effects; where necessary, monitoring will be required during construction and operational phases to demonstrate effectiveness of mitigation measures included in the EIAR;

- Residual effects – consideration of the residual effects remaining after mitigation; and
- Reporting – preparation of the EIAR, including a Non-Technical Summary (NTS).

4 POLICIES & PLANS

4.1 Methodology

4.1.1 This assessment has been undertaken using methods in line with Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 12 – Impact of Road Schemes on Policies and Plans. It has been further informed by:

- Site visits and surveys to provide clarification on existing conditions;
- A review of other EIAR Chapters to establish an understanding of the predicted impacts of the proposed development;
- A review of approved and current planning applications within proximity to the proposed development to inform on any potential conflict with existing or approved land uses and/or further considerations including the cumulative impact of this proposal with other relevant development projects;
- An extensive Community Consultation process which fed into the design and EIA process, as summarised in two Community Consultation Reports published on the DfI Website;
- An EIAR scoping exercise to assist in the establishment of baseline conditions and relevant key environmental considerations in the area as summarised in Chapter 3 of the EIAR; and
- Analysis of prevailing Roads and Planning legislation.

4.1.2 In accordance with the DMRB Part 12, having established and summarised the relevant policies, the proposed development was then assessed against the policies to assess the significance of any associated impacts.

4.2 Findings

4.2.1 The Roads and Planning Legislation, Regional and Local Planning Policies and Plans as outlined within this EIAR Chapter are relevant and material considerations for the proposed development. Each of the material considerations has been assessed in conjunction with the various chapters of the EIAR including; Regional Transportation Strategy NI 2002-2012; Regional Strategic Transport Network Transport Plan 2015; Regional Development Strategy 2035; Strategic Planning Policy Statement 2015; Local Area Plans; Planning Policy Statements. The proposed development has been found to be compliant with all relevant policies and plans.

4.3 Mitigation

4.3.1 A wide range of mitigation measures are detailed as appropriate against each subject area assessed in the EIAR that address potential effects on policy and plans and no specific mitigation measures are necessary for this topic.

4.4 Conclusions

4.4.1 The key aim of the proposed development is to bring forward road improvements which will protect and enhance the safety of road users. The proposal has strived to balance all elements of sustainable development, including economic considerations, conservation interest and environmental objectives, and as such is considered compliant with all relevant policies and plans.

5 LANDSCAPE AND VISUAL

5.1 Methodology

General Approach

5.1.1 The following guidelines and documents have been used to derive the methodology used for assessment within this Chapter:

- DMRB, Volume 11, Section 3, Part 5 Landscape Effects; and
- Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3).

5.1.2 The landscape has been appraised to allow it to be described and classified into landscape character areas that in turn enable the classification of landscape quality. The capacity of the landscape to accept change of the type proposed is assessed by determining the sensitivity of each landscape character area. Overall key landscape components are normally landform, vegetation and historical and cultural components.

5.1.3 Landform relates to topography, drainage characteristics and geology. Historical and cultural components include historic landscapes, listed buildings, conservation areas and historic designed landscapes. Vegetation plays an important role in how the landscape and visual resources of an area are viewed and is an integral component of a landscape character.

5.1.4 Assessment has been undertaken through analysis of:

- Up to date digital copies of Ordnance Survey (OS) Discovery Series raster and OS vector maps;
- Aerial photography;
- Northern Ireland Regional Landscape Character Assessment (NIRLCA);
- Northern Ireland Landscape Character Assessment 2000 (NILCA);
- Area Development Plans;
- Northern Ireland Environment Agency (NIEA) - Register of Historic Parks, Gardens and Demesne; and
- Detailed drawings of the proposed development.

5.1.5 Site visits were undertaken to assess the existing environment, to establish the existing visual resource and to identify sensitive receptors, i.e. residential properties, scenic viewpoints. Site visits were also used to establish the perceived extent of landscape and visual impacts that may be associated with the proposed development.

5.2 Findings

Construction Phase Landscape & Visual Effects

5.2.1 During the construction phase the works are anticipated to be approximately 3 years in duration. Works will be visible during this phase to a varied extent depending upon the individual construction activity at any given time.

5.2.2 With regards to predicted impacts on Local Landscape Character Areas (LLCA) during the construction phase, localised significant effects which are considered to be temporary in duration have been predicted to occur within the Gently Undulating Agricultural Landscape limited to land associated with the formation of new junctions at Listullycurran Road, Gowdystown Road, Skeltons Road, Waringsford Road and the formation of new link road at Milebush Road. Remaining portions of these LLCAs are predicted to experience no significant effect as a result of the proposed development.

5.2.3 Localised significant effects are predicted to be experienced during the construction phase of the north bound on slip at Castlewellan Road, affecting a small portion of the Urban LLCA. These identified effects are considered to be temporary in duration with remaining portions of the Urban LLCA predicted to experience no significant effects during the construction phase.

5.2.4 Of the twenty three viewpoints selected for assessment purposes, seventeen are predicted to experience significant visual effects during the construction phase of the proposed development due to the formation of new overbridge crossings, major ground remodelling works and works required to form new junctions, all of which lie in close proximity to the selected viewpoints. The location of all viewpoints is provided in EIAR Volume II Figures 6.7 to 6.18.

Operational Phase Landscape & Visual Effects

5.2.5 With regards to predicted effects on landscape character during the operational phase (without mitigation), localised moderate effects are predicted to occur within the Gently Undulating Agricultural Landscape Character with effects limited to those portions of the Landscape directly impacted upon by the formation of the new junctions and the proposed link road at Milebush Road.

5.2.6 Localised minor to moderate effects are predicted to be experienced during the operational phase (without mitigation) of the north bound on slip at Castlewellan Road, affecting a small portion of the Urban LLCA at Banbridge.

5.2.7 During the operational phase fourteen of the selected twenty three viewpoints are predicted to experience significant visual effects without mitigation during the operational phase of the proposed development due to the introduction of new features such as overbridge crossings and associated ground remodelling, all of which lie in close proximity to the selected viewpoints.

5.2.8 A residential visual amenity impact assessment has also been undertaken as part of the LVIA. After mitigation, of the 276 groups and individual properties assessed 234 are predicted to experience no effect as a consequence of the proposed development, whilst 35 are predicted to experience minor to moderate but not significant effects during the operational phase of the scheme. It is acknowledged that 7 properties (at locations shown on EIAR Volume II Figures 6.51; 6.53; 6.56; and 6.65) are predicted to experience significant, residual effects after mitigation measures have been implemented, with visual effects associated with the formation of new bridges, cuttings and embankments in close proximity to these properties at Junction 1, Junction 3, Junction 4, and Junction 5.

5.3 Mitigation

5.3.1 Mitigation measures proposed consist of extensive landscape planting at effected areas including re-creation of new field boundary hedgerows and enhancement of existent hedgerows with trees and new woodland planting all of which will be appropriate to the local setting. Environmental barriers in conjunction with landscape planting is proposed at both Castlewellan on-slip lane in the vicinity of Chinauley Park and at Milebush Link that will address visual impact and potential for headlight glare at nearby residential properties. Monitoring of implemented mitigation measures throughout the length of the proposed development shall be carried out to ensure that the proposed mitigation measures become well established and aid the integration of new elements associated with the proposed development into the surrounding landscape.

5.3.2 Following establishment of the proposed mitigation measures, predicted landscape and visual effects associated with the proposed development will be reduced. However, it is considered that bridge structures and embankments in close proximity to residential dwellings will continue to cause long term effects, although such features would gradually integrate into the surrounding landscape, as mitigation planting matures, and will be perceived as part of the visual pattern of the existing A1 road corridor.

5.3.3 Gantries/signage and lighting, proposed at new junctions and at other locations along the proposed development, would also result in new permanent features, though such features are not considered to be uncommon along this established A1 route.

5.4 Conclusions

5.4.1 Following the effective implementation and establishment of the proposed landscape mitigation measures, predicted landscape and visual effects associated with the proposed development will be reduced. It is considered that bridge structures and embankments in close proximity to residential dwellings will gradually integrate into the surrounding landscape, as mitigation planting matures, and will be perceived as part of the local visual pattern and associated with the existing A1 road.

5.4.2 It is considered that through the implementation of the landscape mitigation strategy the proposed development will not result in long term significant adverse effects upon the site itself or wider landscape. The landscape mitigation strategy includes enhancement at proposed junctions and to existing field boundary hedgerows with trees and woodland planting which are appropriate to the local setting, location and the wider context of the site.

6 SOILS, GEOLOGY & CONTAMINATED LAND (INCLUDING WASTE)

6.1 Methodology

6.1.1 The assessment of soils, geology and hydrogeology was based on a desk study of publicly available information such as geological maps, historical borehole logs and maps, consultation with Local Authorities, a site walkover survey and an intrusive ground investigation that identified the ground conditions within the proposed development.

6.2 Findings

6.2.1 The impacts on soils, geology and hydrogeology during the construction phase will be moderate adverse and short term in nature.

6.2.2 At the Castlewellan on-slip road piles are likely to be founded in bedrock and the bedrock aquifer at this location is a secondary aquifer noted to be of poor overall status. As such, piling is considered to have a short term minor adverse impact for the duration of the construction phase on groundwater.

6.2.3 No significant contamination has been identified within the soils at the main junction locations and it is considered that the long term impact to groundwater quality from major earthworks will be neutral.

6.2.4 Minor earthworks associated with Left in and Left Out (LILO) works are considered to have a neutral short term impact during the construction phase as the soils at these locations are generally not currently used for agricultural purposes.

6.2.5 The major earthworks required at the new junctions are considered to have a short term moderate adverse impact due to the loss of local high fertility soils.

6.2.6 No risk to human health from soils, geology or hydrogeology will exist during the operational phase of the proposed development and implementation of mitigation measures. Operational impacts to soils, geology and hydrogeology is considered to be Neutral.

6.2.7 With regards to waste and in conjunction with the proposed mitigation measures, including a Construction Environmental Management Plan (CEMP) and Site Waste Management Plan (SWMP), wastes generated during the distinct phases of the works of the proposed development will have a neutral or slight effect on waste management in the area. There are a range of suitable permitted waste sites with capacity to accommodate waste arising from the proposed development and furthermore there are

a number of management options available on site such as soil stabilisation and pre-loading and offsite such as agricultural improvement, landfill restoration and quarry restoration off-site prior to consideration of disposal to landfill. It is concluded that the proposed development, which includes the safe and proper management of waste streams will have a neutral or slight effect on the environment in relation to waste management.

6.3 Mitigation

6.3.1 Mitigation measures include; preparation of a CEMP and SWMP at construction stage; construction activities should be conducted in a safe environmentally conscious manner and in line with all health and safety guidelines; best practice measures with regard to soil management procedures for the restoration of temporary areas of agricultural land required for construction; the inflow of groundwater will require management during excavation; drains may need to be installed on the cut slopes to control water ingress; filter drains near the toes of slopes will likely offer the best method of draining cuts and drawing the water table down below formation level.

6.4 Conclusions

6.4.1 Following development of the site, which will entail earthworks and implementation of the recommended mitigation measures, the operational impact will be neutral.

7 WATER ENVIRONMENT (INCLUDING FLOOD RISK AND AQUATIC ECOLOGY)

7.1 Methodology

7.1.1 This Chapter of the EIAR addresses the potential Water Quality, Flood Risk and Aquatic Ecology impacts of the proposed development.

7.2 Findings

Flood Risk

7.2.1 The Flood Risk assessment has considered all sources of flooding that may affect the proposed development. There are no designated watercourses that will be impacted by the proposed works. All of the proposed junction locations, with the exception of Castlewellan Road, are affected by minor watercourses which will require either diverting or culverting.

7.2.2 In each location the design of the works to the watercourses has been chosen to minimise the amount of works required and the impact on the floodplain. Hydraulic modelling has been used to demonstrate that there is no increase in flood risk as a result of the proposed development.

7.2.3 The works have been designed to avoid watercourses where possible. Where works are proposed that will impact the watercourses, consideration will be given to providing access to facilitate future maintenance. Where possible, a 5m buffer has been allowed for on all watercourses.

7.2.4 A Drainage Assessment has been completed and the risk of flooding from a drainage aspect to the proposed development and surrounding area can be considered to be low. Culverting is required at a number of locations, but each of these has been carefully considered to minimise the extent of the works required. The proposed works have been discussed with DfI Rivers Area Office representatives who have not highlighted any issues with the proposals. Schedule 6 applications will be submitted for the proposed culverting works at a later date. The proposed works has been shown to be outside of the inundation area of any controlled reservoir.

7.2.5 The proposed development has been shown to be fully compliant with current planning policies in relation to flood risk.

7.2.6 The EU Floods Directive requires that climate change is taken into account in the assessment of flood risk. It is generally recommended for fluvial flooding throughout

Northern Ireland that a single climate change allowance of 20% additional flow is applied to the estimated 'Present Day' 1% Annual Exceedance Probability (AEP) flow and the proposed development models were run with this higher flow. The predicted water levels pre- and post -development were again compared throughout the modelled extent.

7.2.7 The results show that the proposed 1% AEP climate change scenario increases the predicted water levels by small amounts. There is no out-of-bank flooding and the proposed culverts still maintain the recommended minimum freeboard of 250mm.

7.2.8 The significance of the effects of the proposed development on flood risk is therefore 'Neutral'. The Drainage Assessment has shown all storm runoff will be attenuated using Sustainable Urban Drainage Systems (SuDS) and the significance of this impact is therefore 'Neutral'. The net impact of the proposals is neutral, because it results in no appreciable effect, either positive or negative, on the identified attributes.

Water Quality

7.2.9 The proposed development does not directly impinge upon any European Designated Natura 2000 site, but there are three areas designated as Special Protection Areas (SPAs) under the Habitats Directive (92/43/EEC) downstream of the proposed development which have been considered with regard to impact assessment.

7.2.10 A number of watercourses are crossed by the proposed development, the majority of which are minor un-named streams which can be considered as low importance in terms of their hydrological attribute and the assessments indicate that the watercourses in question are small order streams, many of which have already been modified to either accommodate the existing road network or for adjacent agricultural practices. As such, further physical modifications to the affected watercourses from the proposed development are not deemed to be significantly effected.

7.2.11 A fisheries habitat quality assessment was also conducted in each stream potentially impacted by the proposed development. In general the watercourses were of low quality with little fisheries or ecological potential. However, it was concluded that at two locations, Junction 2 and Junction 3, precautionary electrofishing should be carried out as a mitigation measure prior to the works in order to relocate any resident trout or other fish present in these streams.

7.2.12 The assessment has established that the pollution risk associated with the discharge to water courses is low and the predicted impacts are acceptable. The impact significance is therefore assessed to be negligible and no mitigation is therefore required, notwithstanding the fact that attenuation ponds will be provided to attenuate storm water which will also provide water quality benefits.

7.3 Mitigation

Flood Risk

Flood Risk from Watercourses

7.3.1 Mitigation measures are required to ensure there is no new or increased risk of flooding as a result of the proposed development. In each location the junction design has been chosen to minimise the amount of works required to the watercourses. Mitigation measures have involved sizing the works required to the watercourses to ensure that there is no increased flood risk. The hydraulic models were used to consider the impact of the proposed development on flood risk, and determine the best design for the works required to the watercourses. The proposed mitigation measures have all been integrated into the scheme design.

7.3.2 Where new culverts or replacement culverts are being proposed, this will be in accordance with the Construction Industry Research and Information Association (CIRIA) Culvert Design and Operation guide. Consideration has been given to providing a riparian buffer of 5m along the river edge of any realigned section. This is in accordance with the scoping response from DfI Rivers Asset Management Unit.

Flood Risk from Storm Runoff

7.3.3 During the construction phase, any runoff from the construction site will be collected and controlled by the Contractor as described in the construction stage CEMP.

7.3.4 The conceptual drainage design for each junction is based on piped networks of both land and road drainage discharging to a central attenuation pond(s) which will be sized for a 1% AEP storm event and which will be designed to have a permanent pond volume for water treatment purposes in accordance with SuDs design guidance. The central pond(s) will then discharge to the nearest watercourse or culvert at greenfield runoff rate. For all of the junctions there will be two attenuation ponds - a northbound one and a southbound one. The discharge rate will be restricted by the use of a flow control device.

Monitoring

7.3.5 Once the development is constructed, DfI will be responsible for the inspection and maintenance all the culverts, ensuring that they are kept free of debris. Maintenance of the realigned watercourses will be the responsibility of the riparian landowners, who will have to carry out maintenance under the Drainage Order.

Water Quality

Construction Phase Mitigation

7.3.6 Mitigation has already been undertaken during the design phase of the proposed development to minimise the potential impact of the project on the water quality by avoidance where possible.

7.3.7 A comprehensive range of mitigation measures, based on industry best practice and NIEA Standing Advice on pollution control, have been specified to reduce the residual negative effects of potential habitat loss and pollution to the aquatic environment which will be considered during the preparation of construction method statements and inclusion in the CEMP. At Junction 2 and Junction 3, precautionary electrofishing should be carried out. With the successful implementation of the mitigation measures proposed along the length of the proposed development, the residual impact on water quality and aquatic ecology is not considered to be significant.

7.4 Conclusions

Flood Risk

7.4.1 The Flood Risk Assessment has demonstrated that:

a) All sources of flood risk to and from the proposed development have been identified; and

b) There are adequate measures to manage and mitigate any increase in flood risk arising from the proposed development.

Water Quality

7.4.2 An assessment of the significance of the residual impacts has been completed for both the construction and operational phases of the proposed development. Provided the mitigation measures proposed in this assessment are implemented, the residual impact from the construction stage is considered to be negligible to slight adverse and short term. With the mitigation measures for the storm drainage system and hydromorphological alterations, the residual impact from the operational phase on water quality is considered to be neutral/negligible over the long term.

8 BIODIVERSITY

8.1 Methodology

8.1.1 Consultation was undertaken with a number of environmental organisations, including NIEA Natural Environment Division (NED), the Royal Society for the Protection of Birds (RSPB) and Ulster Wildlife.

8.1.2 A desk study was undertaken to gather existing information relevant to the site of the proposed development. Information was obtained through OS maps, aerial photographs, current legislation, internet and database searches, existing literature and reports.

8.1.3 An Extended Phase 1 Habitat Survey was conducted within a 100 m survey corridor centred on the proposed development. Phase 1 Habitat Survey (Joint Nature Conservation Committee (JNCC) 2010) is the standard system used to rapidly record, categorise and map habitats over large areas of countryside. Habitats are mapped using standard colour codes and target notes are used to describe any features of ecological or natural heritage importance. The survey was extended to include further information on the potential of the habitats identified to support species protected by law or of natural heritage importance. Aerial photographs were used as an aid to mapping habitats.

8.1.4 Ecological Surveys for Bats, Badgers and Birds were also carried in accordance recognised methodologies.

8.1.5 A Habitats Regulations Assessment (HRA) has been prepared on behalf of DfI in accordance with DMRB Volume 11, Section 4, Part - Assessment of Implications of Highways and/or Roads Projects on European Sites (Including Appropriate Assessment) to assist the Department in fulfilling its duties as a Competent Authority in accordance with the Habitat Regulations (Northern Ireland) 1995.

8.2 Findings

8.2.1 <u>European Sites (Special Protection Areas (SPAs), Special Areas of Conservation (SACs) and Ramsar sites)</u>

Initial HRA screening concluded that potential significant effects could not be ruled out, in the absence of mitigation, in respect of the following sites: Belfast Lough SPA, Belfast Lough Open Water SPA, the proposed East Coast (Northern Ireland) Marine SPA, Belfast Lough Ramsar Site, North Channel SAC, Lough Neagh and Lough Beg SPA, Lough Neagh and Lough Beg Ramsar Site, Carlingford Shore SAC, Carlingford Lough SPA (NI), Carlingford Lough (IRE) and Carlingford Lough Ramsar Site. Appropriate assessment of these sites identified a number of potential pathways for a significant

effect to arise as a result of both the construction and operational phase of the proposed development including sediment release, side-casting of materials, oil or chemical spillage, effects associated with routine run-off and accidental spillage. The proposed development was taken forward for a Stage 2 HRA.

8.2.2 Sites of Local Nature Conservation Importance (SLNCIs)

The mainline of the proposed development is located in the proximity of three SLNCIs. There are no works proposed within the boundary of any of the SLNCIs. The project will have No Negative Effect on Loughbrickland SLNCI, Ballymaganlis Wood SLNCI or Hillsborough-Dromore Old Railway Line SLNCI.

Habitats

8.2.3 Pre-construction site clearance works will require the removal of all habitats within the scheme extents of each of the junctions, the LILO junctions and the road closures. There will therefore be direct impacts on all habitats within the scheme extents. The majority of the habitat consists of broadleaved, mixed and coniferous plantation woodland; improved grassland; and amenity grassland. Broadleaved semi-natural woodland will be removed at Skeltons Road/Drumneath Road Junction. The proposed development will have a Significant Negative Effect (Minor Adverse) with the short term loss of habitats of local ecological value in absence of mitigation.

8.2.4 Pre-construction site clearance works will have a direct impact on hedgerows which are a Northern Ireland Priority Habitat (NIPH). The proposed development will have a Significant Negative Effect (Moderate Adverse) with the short term loss of NIPH of regional ecological value in the absence of mitigation measures.

8.2.5 The operational phase of the road is not expected to change from the current situation on the existing road and therefore no additional effects on habitats are predicted.

Bats

8.2.6 Pre-construction site clearance works will require the demolition of some structures. It will also require the removal of habitats within the scheme extents of each of the junctions, the LILO junctions and the road closures. There were no confirmed bat roosts identified within the scheme extents. These works in absence of mitigation will result in the potential destruction of unknown bat roosts in trees with Potential Roost Features (PRFs) and also the loss of bat foraging and commuting habitat. The proposed development will have a Significant Negative Effect (Moderate Adverse) on bats with a short term reduction in the amount of available habitat for species of regional importance in the absence of mitigation measures.

8.2.7 The operational phase of the road is not expected to change from the current situation on the existing road and therefore no additional effects on bat species are predicted.

Otter

8.2.8 Construction works will require the culverting of watercourses within the scheme extents. These works will not result in any destruction or damage to otter underground holts or above ground couches as there were no confirmed holts or couches recorded either within or within 30 m of the scheme extents. The works do however have the potential to cause temporary deterioration of water quality; disturbance to otter movements and foraging; and disturbance from noise. The proposed development will have a Significant Negative Effect (Minor Adverse) on otter in absence of mitigation.

8.2.9 The operational phase of the road is not expected to change from the current situation on the existing road and therefore no additional effects on otters are predicted.

Badger

8.2.10 Badgers are vulnerable to persecution and in accordance with the NIEA survey specification (NIEA 2017) the badger survey information must remain confidential and must not be made publicly available. Pre-construction site clearance works will require the removal of all habitats within the scheme extents of each of the junctions, the LILO junctions and the road closures. The works will result in permanent destruction and damage to badger setts; temporary disturbance to badger foraging habitat; and disturbance from noise. The proposed development will have a Significant Negative Effect (Moderate Adverse) on badger a species of local importance in the absence of mitigation measures.

8.2.11 Operational maintenance of the road is not expected to change from the current situation on the existing road and therefore no additional effects on badgers are predicted.

Birds

8.2.12 Pre-construction site clearance works will require the removal of all habitats within the scheme extents of each of the junctions, the left-in/left-out junctions and the road closures. The works will result in the short term loss of bird breeding habitat, if carried out during the bird breeding season, which extends between 1st March and 31st August inclusive. The proposed development will have a Significant Negative Effect (Moderate Adverse) on breeding bird species in the short term with a reduction in the amount of available habitat in the absence of mitigation measures.

8.2.13 The operational phase of the road is not expected to change from the current situation on the existing road and therefore no additional effects on birds are predicted.

Invasive Species

8.2.14 Pre-construction site clearance works will require the removal of all habitats within the scheme extents of each of the junctions, the LILO junctions and the road closures. The works will result in the temporary disturbance and potential spread of invasive non-native species both within the site and within the surrounding area in the absence of mitigation measures. The proposed development will have a Significant Adverse Impact (Minor Adverse) on habitats at of local ecological value in the absence of mitigation measures.

8.3 Mitigation

8.3.1 An Ecological Clerk of Works (ECoW) will be employed by DfI or its agents to monitor and regularly inspect the implementation of all ecological mitigation contained in the EIAR, HRA Report and the CEMP. The ECoW will provide advice both pre-construction and during construction in relation to legislation relating to the protection of ecological features; to provide advice on the timing of works and the implementation of mitigation and compensation measures; to apply for relevant derogation licences; to monitor identified works; and to produce site inspection reports.

Designated Sites

8.3.2 An outline CEMP has been produced for the proposed development as provided in EIAR Appendix 2.4. The outline CEMP includes sediment control measures, the production and implementation of an appropriate Emergency Spill Response Plan, best practice measures and utmost care utilised in the use of concrete, appropriate storage and use of chemicals, surface water channel realignment and appropriate site drainage design.

8.3.3 The provision of these measures to prevent the risk of pollution and deterioration of the water quality will ensure that no potential for a significant effect upon the integrity of any European Site will arise as a result of the proposed development. As such it is considered that the information presented above is sufficient to allow the Department as a Competent Authority to discharge their obligations under the Habitats Regulations (1995), and that this information provides adequate assurance (no reasonable scientific doubt remaining), that the proposed development will not give rise to such an effect.

8.3.4 The Stage 2 HRA concludes that there will be no adverse effect upon the integrity of any European site.

Habitats

8.3.5 Existing woodland, individual trees and hedgerows will be retained where possible and shall be protected during the construction phase in accordance with British Standard

(BS): 5837 2012 'Trees in relation to design, demolition and construction – Recommendations'.

8.3.6 Reinstatement of habitats within the extents of each of the proposed junctions, the LILO junctions and the road closures will be carried out following completion of construction works. Landscape planting will use native species to create new woodland, screening woodland, areas of low scrub and hedgerows. Hedgerows will be replanted with native species and a proportion of the hedgerows replanted will be species-rich hedgerows containing five or more native woody species in a 30m length.

8.3.7 The implementation of the mitigation measures will reduce the likely significance of effects on habitats of local importance from a Significant Negative Effect (Minor Adverse) to No Significant Effect and reduce the likely significance of effects on NIPH from a Significant Negative Effect (Moderate Adverse) to Significant Adverse Impact (Minor Adverse) with the temporary disturbance to habitats of regional importance but no permanent loss of habitat.

Bats

8.3.8 A Bat Roost Inspection Survey of buildings to be demolished and a Bat Roost Inspection Survey of Trees scheduled for removal will be completed by an ECoW immediately prior to pre-construction site clearance works. All bat roosts are protected by law even when bats are not presently occupying a roost. If bats are found to be present, a derogation licence must obtained from NIEA for the exclusion of bats for development purposes to permit otherwise illegal activities that could result in the destruction, damage or disturbance of a bat roost, which includes all necessary compensation measures to ensure no detriment to the maintenance of the population at a favourable conservation status. The licence will be issued to the ECoW who will supervise all licensed activities. Provision of 3 No Bat Boxes With Built-in Wooden Rear Panel; 3 No. Bat Colony Boxes; and 3 No. Universal Bat Boxes to compensate for the loss of building and tree cavities. The bat boxes will be erected by the ECoW on retained trees prior to the demolition of any building or tree removal.

8.3.9 Reinstatement of habitats within the extents of each of the proposed junctions, the LILO junctions and the road closures will be carried out following completion of construction works.

8.3.10 The implementation of the mitigation measures as set out above will reduce the likely significance of effects on bats from a Significant Negative Effect (Moderate Adverse) to a Significant Negative Effect (Minor Adverse).

Otter

8.3.11 Otter holts are protected by law even when otters are not presently occupying a holt. If any otter underground holts or above ground couches are found either within or within 30 m of the scheme extents or an otter natal den is found within 150 m of the scheme extents, work will stop immediately to avoid breaking the law and the ECoW will be contacted. Any construction work required within 30 m of an otter holt or couch and/or 150 m of an otter natal den will require a derogation licence from NIEA to permit otherwise illegal activities that could result in disturbance to an otter and/or damage or destruction of an otter holt. The licence will be issued to the ECoW who will supervise all licensed activities.

8.3.12 The implementation of the mitigation measures as set out above will reduce the likely significance of effects on otter from a Significant Negative Effect (Minor Adverse) to No Significant Effect.

Badger

8.3.13 A derogation licence will be obtained from the NIEA for the exclusion and permanent closure of seven badger setts identified along the route of the proposed development. The licence will permit otherwise illegal activities that could result in disturbance to a badger and/or damage or destruction of a badger sett. Licenced activities will not take place during the badger breeding season which extends from 30th November to the 1st July.

8.3.14 An artificial badger sett(s) will be constructed at the proposed Junction 4. The artificial badger sett(s) will be created and positioned in close proximity to the existing setts to be permanently closed and will include a replacement main sett, annexe sett and subsidiary/outlier sett. The artificial sett will be constructed a minimum of six months prior to any existing sett closure.

8.3.15 An Ecological Exclusion Zone (EEZ) will be set up around one badger sett at the proposed Junction 3. Temporary hi-visibility fencing will be erected 25 m from the nearest sett entrance. The specification of the fence will aim to keep contractors out of the EEZ while allowing free access in and out of the sett so that badgers can continue to move within their territorial boundaries. No vehicles, storage or stockpiling of materials will be allowed within the EEZ. An ECoW will supervise the erection of the EEZ and monitor badger activity throughout construction. Fencing will be inspected daily by the Contractor to ensure that it is in working condition.

8.3.16 Construction works in the vicinity of a badger sett EEZ will cease two hours prior to sunset. Open excavations and/or trenches will either be covered to avoid access by

wildlife or a means of escape installed to facilitate egress at the end of each working day. All pipes will be capped overnight to prevent access by mammals.

8.3.17 Badger setts are protected by law even when badgers are not presently occupying a sett. If any additional badger setts are found within the Construction Corridor or within 25 m of construction works, work will stop immediately to avoid breaking the law and the ECoW will be contacted. Construction work within 25 m of a badger sett will require a derogation licence from NIEA to permit otherwise illegal activities that could result in disturbance to a badger and/or damage or destruction of a badger sett. The licence will be issued to an ECoW who will supervise all licensed activities.

8.3.18 The implementation of the badger sett compensatory measures as set out above will reduce the likely significance of effects on badgers from a Significant Negative Effect (Moderate Adverse) to Significant Negative Effect (Minor Adverse).

Birds

8.3.19 Pre-construction site clearance works and removal of vegetation including trees, scrub, hedgerows and shrubs will take place outside the bird breeding season which extends between 1st March and 31st August inclusive to ensure breeding birds are protected from harm.

8.3.20 If pre-construction site clearance and removal of vegetation is deemed necessary within the bird breeding season an ECoW will undertake a survey to check for breeding birds immediately prior to works and confirm that breeding birds will be protected from harm during works.

8.3.21 Reinstatement of habitats within the scheme extents of each of the junctions, the left-in/left-out junctions and the road closures will be carried out following completion of construction works.

8.3.22 The implementation of the mitigation measures as set out above will reduce the likely significance of effects on breeding birds from a Significant Negative Effect (Moderate Adverse) to No Significant Effect.

Invasive Species

8.3.23 An EEZ will be set up around invasive non-native species at the proposed Listullycurran Road Junction 1. Temporary hi-visibility fencing will be erected 10 m horizontally from each stand and signs erected warning of the presence of invasive non-native species. The 10 m EEZ is designed to prevent disturbance to both the plant species and ground surrounding the plant likely to be contaminated by the seed bank or underground rhizome system. No vehicles, storage or stockpiling of materials will be allowed within

the EEZ. An ECoW will supervise the erection of fencing at the EEZ. Fencing will be inspected daily by the Contractors Nominated Representative to ensure that it is in working condition.

8.3.24 The implementation of the mitigation measures will reduce the likely significance of effects from a Significant Adverse Impact (Minor Adverse) on habitats at of local ecological value to No Significant Effect.

Ecological Constraints & Opportunities Plan

8.3.25 An Ecological Constraints and Opportunities Plan drawing (ECOP) will be prepared and included within the CEMP for the project post-planning to provide an overview of all ecological constraints.

8.3.26 Method Statements will accompany the ECOP, where necessary, to provide detailed information on pre-construction vegetation clearance; on creation of artificial badger setts and the permanent closure of badger setts and on the management of invasive non-native species.

Monitoring

8.3.27 The following monitoring during construction period is proposed:

- Bat Roost Inspection Survey of Buildings to be demolished and a Bat Roost Inspection Survey of Trees scheduled for removal will be completed by an ECoW immediately prior to pre-construction site clearance works;
- Artificial setts shall be monitored throughout the duration of the construction phase of the proposed development;
- If pre-construction site clearance and removal of vegetation is deemed necessary within the bird breeding season (1st March – 31st August), an ECoW will undertake a survey to check for breeding birds immediately prior to works and confirm that breeding birds will be protected from harm during works;
- An ECoW will monitor badger activity throughout construction;
- EEZ fencing around badger setts will be inspected daily by the Contractor Nominated Representative to ensure that it is in working condition; and
- EEZ fencing around invasive species will be inspected daily by the Contractors Nominated Representative to ensure that it is in working condition.

8.4 Conclusions

8.4.1 An ecological assessment has been completed which identified, described and assessed in an appropriate manner, the direct and indirect significant effects of the proposed development on biodiversity, with particular attention to species and habitats protected under the Birds and Habitats Directives.

8.4.2 The potential effects of the proposed development on the ecological environment and its receptors have been assessed and it is concluded that with the implementation of appropriate mitigation measures, which can be secured through conditions, the residual effects would not adversely affect the integrity of any European site or result in any significant adverse residual effects on the ecological features.

9 AIR QUALITY

9.1 Methodology

9.1.1 This Chapter of the EIAR considers the potential impacts of the proposed development on air quality during construction and operation. The existing air quality throughout the area is characterised by the existing emissions from road traffic. Air quality modelling was undertaken to determine the potential for changes to air quality as a result of the proposed development, and any related impacts on representative sensitive receptors. The assessment used air quality monitoring data, nationally available background data and modelling to consider the following pollutants emitted from vehicles; nitrogen oxides, nitrogen dioxide (NO_2) and particulate matter ($PM_{2.5}$ and PM_{10}).

9.2 Findings

9.2.1 Predicted pollutant concentration changes at existing receptors as a result of the proposed development were assessed using the Institute of Air Quality Management (IAQM) significance criteria. The findings of the Local air quality assessment of operational phase impacts concluded that whilst some receptors would experience changes in NO_2 and PM_{10} concentrations, the significance of effect would be Negligible in all cases, as pollutants are well below National Air Quality Standard (NAQS) limit values. The relevant air quality objectives for $PM_{2.5}$, PM_{10} and NO_2 will not be significantly affected at existing receptors as a consequence of the proposed development.

9.2.2 With regards to potential disruption during construction to receptors, nuisance may be in the form of excessive dust, generated particularly during prolonged dry periods, and operation of construction machinery, which can emit higher than normal levels of airborne contaminants. This is typical on any project which involves movement of quantities of material for earthwork and road construction.

9.3 Mitigation

9.3.1 Construction of the proposed development would temporarily impact air quality as a result of dust from construction activities, such as earth moving and excavations, and emissions from construction traffic and equipment/plant. During the construction phase of the proposed development the appointed contractor will be required to implement appropriate dust control measures and as such, the proposed development is not expected to have any significant residual impacts.

9.3.2 Mitigation measures in the CEMP will include for dust management, control and use of equipment/plant and construction traffic management. These will minimise the temporary impacts during construction activities. Through good site practice and the

implementation of suitable mitigation measures however, the effect of dust and PM10 releases will be reduced and excessive releases prevented. The residual effects of on-site construction activities on local air quality will not be significant.

9.4 Conclusions

9.4.1 The assessment of dust and PM_{10} effects from the construction phase of the proposed development was subject to a qualitative assessment following IAQM guidance. Effective mitigation measures for fugitive dusts would be implemented under site management controls by the Appointed Contractor including the production of a Dust Management Plan (DMP contained in the CEMP). With such mitigation in place, the assessment carried out has shown that any off-site impacts from dust emissions during the construction phase would be not significant. There are no predicted significant residual impacts from construction dust from the proposed development.

9.4.2 At the operational phase an overall improvement to atmospheric pollutant concentrations through improved technologies and the utilisation of cleaner fuels means the levels of PM_{10} and NO_2 are expected to continue to decrease. The Air Quality assessment has concluded that there are no significant local air quality impacts at either human exposure locations or ecological receptors.

10 CLIMATE AND GREENHOUSE GASES

10.1 Methodology

10.1.1 This Chapter of the EIAR presents the assessment that considers the effects on climate and associated Greenhouse Gas emissions (GHG) due to the proposed development. Carbon dioxide is considered the most important GHG and therefore is used as a key indicator for the purposes of assessing the impacts of projects on climate change. The chapter references, The Institute of Environmental Management & Assessments (IEMA) EIA Guide to: Assessing Greenhouse Gas Emission and Evaluating their Significance, 2017. This IEMA document also endorses the use of the DMRB Regional Assessment for road schemes in terms of assessing GHG emissions.

10.2 Findings

10.2.1 The changes in GHG emissions as a result of the proposed development were considered in the context of total UK emissions provided by the National Atmospheric Emission Inventory (NAEI). The consideration of the significance of the proposed developments impact on GHG emissions was undertaken using professional judgement considering the change predicted and the sensitivity of the national (UK) total to change, with the significance of effect assessed.

10.2.2 The predicted changes are negligible in terms of GHG emissions for the proposed development and the impact on national levels and are not significant.

10.3 Mitigation

10.3.1 Measures will be employed to reduce the use of materials and the generation of waste in relation to the proposed development. There is significant relationship between materials re-use and the avoidance of the generation of waste. Therefore, there is a considerable overlap between the mitigation measures for materials and waste, which will in turn lead to a reduction in the embodied carbon impacts from the proposed development.

10.3.2 During the construction stage a range of mitigation measures are proposed to reduce the use of materials and the generation of waste which will in turn lead to a reduction in the embodied carbon impacts. These mitigation measures will be incorporated into the construction stage CEMP and SWMP.

10.3.3 Where practicable, the key material elements (i.e. aggregates, asphalt, cement, precast concrete products, ready-mixed concrete and steel) used within the proposed development shall be specified to be responsibly sourced from suppliers who should have a minimum ISO 14001 certification.

10.4 Conclusions

10.4.1 There are no predicted significant impacts from GHG emissions from the proposed development.

11 NOISE AND VIBRATION

11.1 Methodology

11.1.1 The Chapter of the EIAR presents the assessment of the potential noise impacts associated with the proposed development. This chapter is focussed on determining the worst-case noise level increases at the nearest sensitive receptors as a result of the proposals, both during construction and during operation within a 300m study area and assessing the significance of effects.

11.1.2 This assessment is based on the guidance given in the DMRB Volume 11, Section 3, Part 7. The DMRB methodology allocates an assessment methodology according to the risk, with three levels of assessment described (scoping, simple and detailed).

11.1.3 The Calculation of Road Traffic Noise (CRTN) guidance document outlines the procedures to be applied for calculating noise from road traffic. These procedures are necessary to enable entitlement under the Noise Insulation Regulations (NI) 1995 to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning.

11.1.4 Noise monitoring was conducted in the vicinity of the proposed development in order to characterise the noise environment from the existing road. The purpose of the noise monitoring survey was to record noise levels adjacent to the existing road, in order to validate the noise predictions included in the noise model.

11.1.5 A noise modelling software package called CadnaA was used to map the proposed development for the Baseline, Do Minimum and Do Something scenarios. This software package uses the prediction methodologies described in CRTN, along with a range of topographical and OS data collected on the existing roads, proposed road improvements and surrounding area to build up a picture of the noise environment in the vicinity of the sensitive receptors within the study area. The software builds a 3-dimensional model of features which may affect the generation and propagation of noise.

11.1.6 Traffic data used was for the baseline year, year of opening and the design year. For the purposes of assessing worst case scenario, the Annual Average Daily Traffic (AADT) High traffic flow values have been used in this assessment.

11.1.7 In order to calibrate the output from the noise model, a comparison was made between the predicted noise levels in the base year model and the measured noise levels from the baseline monitoring survey carried out.

11.2 Findings

11.2.1 Regarding the assessment of impacts from the operational phase the assessment has considered 454 of the nearest noise sensitive properties and noise levels at each of these locations have been modelled by selecting appropriate receptor locations within the noise model (i.e. the most exposed facade).

11.2.2 In line with current best practice the guidance the predicted adverse impact at all modelled receptors except one is negligible, while there is a minor adverse noise impact at one property. The predicted operational noise impact at all the modelled noise sensitive receptors is therefore not significant.

11.3 Mitigation

Construction Phase

11.3.1 A range of mitigation measures have been clearly defined within the assessment to reduce potential construction phase noise impacts, including the installation of a temporary noise barrier (approximately 2m height) placed between the construction activities and all properties in close proximity to the construction site (all properties within 100m of the proposed site of construction). If properly installed, such a barrier in tandem with other on site mitigation measures will ensure that construction noise levels are below the relevant noise threshold limits.

11.3.2 BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These are best practice measures and will be adopted for the construction phase.

11.3.3 In order to minimise the likelihood of complaints, Armagh City, Banbridge and Craigavon Borough Council and Lisburn and Castlereagh City Council and affected residents should be kept informed of the works to be carried out and of any proposals for work outside normal hours. A complaints procedure shall be operated by the Contractor throughout the construction phase within the CEMP.

11.3.4 It is recommended that on-site monitoring of noise levels and construction activities be undertaken in order to verify the predicted worst-case noise levels and also to ensure that all available and appropriate measures are implemented to minimise the potential impact upon local sensitive receptors.

Operational Phase

11.3.5 An assessment of the effects of road traffic noise on the study area has been carried out based on the methodologies described in the DMRB.

11.3.6 The modelled results indicate that all properties modelled will experience a minor or negligible impact from the proposed development. In addition to this, predicted noise levels at none of the modelled locations satisfy the conditions required for compensation as set out in the Noise Insulation Regulations (Northern Ireland) 1995.

11.3.7 No noise mitigation measures are required for properties within the study area during the operational phase, on account of the proposed development. Whilst not required on the basis of the noise impact assessment, an environmental barrier will be included adjacent to the Castlewellan on-slip lane in the vicinity of Chinauley Park. This barrier will result in an amelioration of the noise environment in the vicinity of Chinauley Park, which will assist in the overall environmental impact by off-setting the effect of the loss of the visual screening provided by the existing trees in this location.

11.4 Conclusions

11.4.1 During the construction phase of the proposed development, noise levels will be temporarily increased in the vicinity of some of the nearest noise sensitive properties to the proposal. Subject to the use of noise barriers, construction noise levels will be maintained below the recommended noise threshold limits included in BS5228:2009. There is no predicted operational noise impact as a result of the proposed development. The modelled results in the impact assessment indicate that all properties modelled will experience a minor or negligible impact from the proposed development and no significant effects are predicted.

12 CULTURAL HERITAGE

12.1 Methodology

Desktop Survey

12.1.1 The general landscape (within approximately 1km of the proposed development) contains a low to moderate number of cultural heritage sites, including Sites and Monuments Record (SMR) sites; Industrial Heritage Record (IHR) sites; Listed Buildings; Scheduled Areas; Historic Parks, Gardens and Demesnes and Defence Heritage sites.

12.1.2 In addition, consultation has been carried out with relevant stakeholders as part of the overall project management for the proposed development. Due consideration has been taken of any relevant comments and views, in particular of the Department of Communities (DfC) Historic Environment Division (HED). Any third-party consultee commentary derived from this field visit has been acknowledged in the preparation of the impact and mitigation sections of this assessment, as well as the provision of advance archaeological evaluation (testing) works.

Walkover Survey

12.1.3 An inspection of the proposed development area was undertaken by a team of suitably qualified archaeologists in order to assess the existing Cultural Heritage environment. Field survey was conducted primarily in greenfield areas that would be subject to significant ground disturbance during construction stage as well as immediate adjacent areas where assessment of visual impact on the setting or context of a recorded Cultural Heritage site was required.

12.1.4 During this walkover survey and assessment of the proposed development, the qualified archaeologists were also accompanied by three archaeologists from DfC HED.

12.2 Findings

12.2.1 Regarding the assessment of impacts there are a small number of recorded cultural heritage sites located within close proximity to the proposed works associated with the proposed development. As summarised in EIAR Volume I Table 14.22 the proposed development has the potential to have a direct impact during the construction phase of slight/moderate significance of effect on three recorded archaeological sites and potentially direct impact of moderate significance of effect on previously unrecorded sub-surface archaeology adjacent to a scheduled rath. There are indirect visual impacts at both the construction and operational phase on a listed building and a scheduled rath site of slight/neutral significance of effect due to the presence of the screening

vegetation and the existing A1 road in views. The indirect impacts during the construction phase will be of a visual nature, such as machinery and equipment, which will be temporary.

12.3 Mitigation

12.3.1 In terms of mitigation and monitoring for the proposed development all greenfield areas that will be subject to development/ ground reduction should be subject to an archaeological programme of monitored topsoil stripping (watching brief) under archaeological licence from DfC HED.

12.3.2 The topsoil stripping should be undertaken using a mechanical excavator fitted with a toothless ditching bucket under the constant supervision of the licensee. Should archaeological remains be uncovered appropriate mitigation such as, preservation in situ (preferred option) or further archaeological work in the form of archaeological excavation and recording will be implemented. These works should take place post-planning, but at the outset of the construction works. Sufficient time and resources should be allowed for in the construction programme to deal with potential archaeology that may be uncovered. This archaeological programme should be implemented as far in advance of other construction related works as possible to allow sufficient time to fully excavate and record archaeological material that is uncovered but cannot be preserved in situ.

12.3.3 All archaeological excavations will require a post-excavation phase of works to be undertaken off site.

12.4 Conclusions

12.4.1 At the construction phase the proposed development has the potential to have a direct impact of slight/moderate significance of effect on three recorded archaeological sites and potentially direct impact of moderate significance of effect on previously unrecorded sub-surface archaeology. At the construction and operational phases there are indirect visual impacts on a listed building and a scheduled rath site of slight/neutral significance of effect. Overall with the implementation of mitigation no significant effects are predicted.

13 POPULATION AND HUMAN HEALTH

13.1 Methodology

Policy Review

13.1.1 The purpose of the population and health assessment is to draw from and build upon the associated EIAR chapters (air, noise, traffic, pedestrian equestrians and community effects), and to further communicate what this means in terms of potential population and health effects on communities in proximity to the proposed development.

13.1.2 Methods employed in a particular population and health assessment are proportionate and tailored to meet the assessment requirements of the project in question, which can differ considerably depending on the scale and nature of a proposal, but are further influenced by local context and varying community circumstance and sensitivity.

13.1.3 There is a large body of guidance on Health Impact Assessment (HIA) generally and in the context of development planning, drawing from expert evidence and national government policy regarding the importance of integrating public health into the planning system.

13.2 Findings

13.2.1 During the construction of the proposed development, mitigation relevant to the protection of health is present in the form of a CEMP which details the construction methodology, site controls, procedures and site-specific actions that will be implemented to minimise impacts.

13.2.2 Potential air quality related population and health effects during construction are limited to nuisance from dust and are not considered to be significant. Noise generated during the construction phase would be during daytime hours only, therefore eliminating any risk of health effects associated with sleep disturbance and limiting potential health effects to annoyance from loss of amenity.

13.2.3 Traffic noise levels associated with the construction phase of the proposed development will be significantly less than 1dB (A) which is not considered to be perceptible and would not be sufficient to quantify any change in community health outcomes.

13.2.4 As a result, the magnitude of impact on population and health from construction traffic would be negligible resulting in a negligible significance of effect in an area considered of low sensitivity. On the above basis, potential changes in noise generated from traffic and associated health impact are considered not significant.

13.2.5 Potential population and health effects during operation of the proposed development are limited as the alignment of the A1 remains the same and there would be no significant increase in traffic flows. The main purpose of the proposed development is to upgrade infrastructure and improve safety. Overall, it is predicted that there would be a positive population and health effect based on the reduction in risk of accident and injury.

13.3 Mitigation

13.3.1 An outline CEMP has been provided as part of the EIAR (Appendix 2.4). This document provides a framework from which a final CEMP will be developed to avoid minimise or mitigate any construction effects on the environment This outline CEMP details the environmental monitoring and mitigation measures that are to be implemented during construction works (and pre-construction) to minimise the effects on receptors. The detailed mitigation and control mechanisms contained within this outline CEMP are informed by the assessments contained within the associated EIAR chapters.

13.3.2 Further population and health mitigation would therefore be limited to ongoing engagement with local communities to raise awareness of any particularly disruptive construction activities, to monitor and feedback the effectiveness of mitigation, and respond to community concerns.

Operational Phase

13.3.3 No further mitigation relating to population and health during the operational stage of the proposed development is considered necessary.

13.4 Conclusions

13.4.1 The proposed development is an online, safety driven scheme. Therefore, once operational, this section of the A1 would ultimately continue to function as before but with reduced risk of accident and injury. There would be no additional traffic as a result of the proposed development, which removes the potential for significant associated increases in air pollutants and noise that could adversely affect human health. Overall, the improved safety of this section of the A1 during operation would be beneficial to road users and the surrounding communities.

13.4.2 As a result of the clear beneficial population and health effects during operation, the primary focus of this population and health assessment is on the construction phase. Construction activities along this section of the A1 would last approximately three years where in a worst-case scenario would cause intermittent impacts during day time hours only. Population and health effects related to intermittent construction impacts is limited to annoyance at residential receptors as no schools have been identified in proximity to

the proposed development. In addition, there would be minor benefits to population and health from construction-related employment opportunities.

13.4.3 Overall, the construction and operation of the proposed development is not predicted to be of a nature or duration to quantify a measurable adverse population and health effect. Due to the employment provided during the construction phase and the safety driven nature of the scheme, overall, the proposed development would provide minor short and long-term benefits to population and health.

14 LAND USE

14.1 Methodology

14.1.1 This Chapter of the EIAR assesses the potential impacts of the proposed development on land use resources. These resources include private property, land used by the community, development land and agricultural land, including the effect on agricultural land quality and farm holdings.

14.2 Findings

Private Property

14.2.1 Two residential properties would need to be demolished, one at the existing junction of Milebush Road (North) affected by the LILO Junctions works and the second one located off Gowdystown Road within the Junction 3 works area to the south of Dromore. In addition, stables buildings within the Junction 2 and Junction 3 works areas, and a derelict stone building and tin clad shed, in a poor state of repair, within the Junction 5 works area would have to be demolished prior to construction works commencing.

14.2.2 The permanent loss of two residential properties as a result of the proposed development is not anticipated to have a significant effect on housing stock in the area. The loss of other buildings, generally in a poor state of repair, are also not considered to have a significant effect on similar resources within the local area.

14.2.3 The sensitivity of these resources is considered to be low, i.e. of low or medium importance and rarity, local scale. The magnitude of the potential impact on these resources is assessed to be minor adverse. Taking these factors into account, the effects on private property during construction are assessed to be permanent and of slight adverse significance.

Open Space, Sport and Outdoor Recreation

14.2.4 There would be no physical impacts on areas of open space, or sport and outdoor recreation facilities as a result of the proposed development.

Development Land

14.2.5 There would be no impacts on any parcels of land within the towns and villages alongside the A1 that have been identified in the Banbridge / Newry and Mourne Area Plan 2015 as potential development areas.

Agricultural Land and Farm Holdings

14.2.6 The impact of the proposed development on agricultural land would occur at the construction period. The main areas of agricultural land affected would be at the five new junction locations. Whilst these junction works would affect areas of land within individual land holdings, access to individual parcels of land would be maintained and no substantive agricultural buildings would be affected.

14.2.7 The works around existing junctions for LILO's would also affect small areas of land, permanently affecting, and mainly agricultural land being used for permanent pasture. Specific agricultural impact assessments have been undertaken as appropriate for farm holdings.

14.3 Mitigation

14.3.1 Regarding mitigation measures at construction stage the restoration of temporary areas of land required for construction to agricultural use will take place following recognised best practice measures. Further, measures to reduce the impact on farm holdings during the construction period shall include; maintaining water supplies; maintaining farm access; appropriate fencing of farm holdings; implementation of best practice to avoid spread of disease.

14.3.2 The restoration of temporary areas of land required for construction to agricultural use shall implement the following recognised best practice measures.

14.3.3 Specific mitigation measures are required in relation of agricultural land and farm holdings and have been detailed as part of the EIAR. Accommodation lanes have been proposed as required and detailed assessment of potential options have been undertaken.

14.4 Conclusions

14.4.1 There will be limited demolition of private property; and no physical impact of open space, sport and outdoor recreation resources; or areas identified for development in the Banbridge / Newry and Mourne Area Plan 2015 as a result of the operation of the proposed development.

14.4.2 There will be no further physical effects on agricultural land and farm holdings during the operational period. The effect on farm holdings would be localised and would not render farming enterprises unworkable.

15 PEDESTRIANS, CYCLISTS, EQUESTRIANS & COMMUNITY EFFECTS

15.1 Methodology

15.1.1 The methodology for preparation of this chapter has been considered using the DMRB Vol 11 Section 3 Part 8. In assessing the impacts on Pedestrians, Cyclists, Equestrians and Community Effects the assessment includes consideration of:

- Journey length and local travel patterns; and
- Severance – Including relief from severance and newly created severance.

15.2 Findings

15.2.1 Impacts on accessibility/severance during construction will be short in duration, and of moderate localised impact. With traffic management mitigation measures the residual impact will be of minor significance and temporary inconvenience.

15.2.2 There will be potentially direct impacts on accessibility and severance for communities from temporary road closures and indirect impacts resulting from some delay in journey times through increased construction traffic.

15.2.3 Given the very low numbers of pedestrians and cyclist affected, the impact on these receptors is deemed to be of negligible significance.

15.2.4 Existing pedestrian facilities along the A1 mainline are very limited and where they do exist, these are to be retained so there is no direct impact on existing pedestrian facilities.

15.2.5 It is not proposed to provide any additional pedestrian facilities along the A1 carriageway and the central barrier of the A1 will be completely closed. It is a project design objective to actively discourage pedestrian movements along and across the A1 in line with the main project driver which is to improve safety along the route.

15.2.6 Where Compact Grade Separated Junctions (CGSJs) have been provided, dedicated pedestrian facilities form part of the design proposals. These facilities link with the proposed bus stops. These pedestrian facilities are designed to standard with dropped kerbs and tactile paving to facilitate pedestrian as well as disabled access.

15.2.7 More specifically pedestrian facilities are proposed at the following key junctions:

- Bus stop facility with parking for drop off/ patrons at Listullycurran Road junction;

- Bus stop facility with parking for drop off/ patrons at Gowdystown Road junction;
- Bus stop facility with parking for drop off/patrons at Skeltons Road junction; and
- Bus stop facility with parking for drop off/ patrons at Waringsford Road junction.

15.2.8 The pedestrian facilities proposed are to ensure the safe movement of people at the proposed bus stop facilities.

15.2.9 There is therefore no negative impact on the facilities available to pedestrians. The provision of additional dedicated pedestrian linkages at the 4 junctions providing bus stop facilities with parking for drop off/ patrons is a direct beneficial effect which must be deemed to be significant in respect of enhanced safe access to public transport facilities.

15.2.10 The addition of a central barrier to prevent unsafe crossing of the dual carriageway does not materially change accessibility for pedestrians as the numbers executing this unsafe practice at the existing road on the evidence of feedback from community consultation are considered to be low. The impact on accessibility is therefore minor but the overall impact is beneficial in that pedestrian safety is significantly enhanced.

15.2.11 Cyclists - No cycling facilities are proposed and none exist currently. At LILO junctions, kerbed islands are set back to facilitate cyclists and reduce the risk of merging into vehicular traffic to avoid these barriers. The impact is deemed to be moderate beneficial.

15.2.12 Equestrians - There is no evidence of any significant equestrian use of the A1 within the study area. The intensity and speed of traffic along the mainline does not make this a route that is attractive to equestrians for use.

15.2.13 For safety reasons, design proposals do not provide for any equestrian facilities along the extent of the route. The position in respect of equestrian users will therefore not materially change as a result of the implementation of the scheme. The impact on these receptors will be negligible.

15.2.14 Bus stops are viewed as the main pedestrian trip generators. All mainline bus stops will be replaced with bus stop facilities at the four proposed CGSJs resulting in a moderate beneficial impact. Community impact is slight/low due to low usage (average of 1-2 patrons per day) using the existing facilities.

15.2.15 No community facility access will be closed. Upgraded and enhanced access arrangements provide a moderate beneficial impact.

15.3 Mitigation

15.3.1 Mitigation measures to minimise perceived adverse impacts include:

- Design measures ensuring private driveways are replaced on a like by like basis or through agreeable alternative solutions;
- The provision of appropriately located grade separated junctions to improve safety and minimise impact;
- The provision of upgraded and appropriately located bus stop facilities;
- Retention of all existing pedestrian footways where present;
- CEMP to minimise construction impacts; and
- Provision of alternative accesses to community facilities if required during cosntruction.

15.4 Conclusions

15.4.1 The assessment supports the following conclusions regarding the impacts of the proposed development on the existing Pedestrians, Cyclists, Equestrians and Community Facilities along proposed development:

- Pedestrians – Have been considered at all stages of the design process. No existing pedestrian facilities will be removed by the project however pedestrian movements will not be encouraged along the mainline. Where CGSJs are proposed pedestrian facilities are an integral part of the design at any bus stop facilities;
- Cyclists – There are no existing dedicated cycling facilities within the scheme area. None are proposed as part of this scheme. The prevention of right turning movements along the A1 mainline through the closure of the central reserve, the provision of left in / left out junctions and the closure of 9 selected side roads will make cycling along the mainline a safer experience;
- Equestrians – There is no survey record of equestrians using the mainline or the existing junctions. There are no dedicated equestrian facilities within the scheme extents, nor are any proposed. It is proposed there will be no impact on equestrians;
- Community Trips and Trip Generators - The removal of bus stops from the A1 mainline will impact upon a very small portion of the community. The consequence of this impact is mitigated by the alternative bus stop provision at the proposed CGSJs which has the potential to increase patronage of public transport services and thereby increase accessibility;
- Severance – The provision of a continuous central barrier, whilst aimed mainly at preventing motorised right turning movements will have severance implications for bus stop users. The number of persons affected is small, whilst the impact is

mitigated by the provision of new facilities at each CGSJ. This significance of this perceived impact will reduce with time;

- Amenity – The A1 and its junctions are of low amenity value. Largely this will remain unchanged however design proposals will improve safety along the route; and

- Safety – This is a safety driven project and all impacts must be contextualised against the overarching objective to reduce the number of accidents along this section of the A1.

16 MATERIAL ASSETS

16.1 Methodology

16.1.1 Article 3 of Council Directive 85/337/EEC (as amended) requires that effects of a project on material assets be identified and assessed. The structure of DMRB Volume 11 Environmental Assessment accounts for this with the inclusion of Section 3, Part 6 Materials. A number of utility providers have installations within the study area and as part of the design process there has been liaison with the following utility companies:

- Northern Ireland Electricity (NIE);
- Northern Ireland Water (NIW);
- British Telecom (BT);
- Phoenix Gas; and
- Firmus Gas.

16.1.2 In each case, detailed talks have been held with representatives from the above utility companies and costs for diversions and provisional service layouts obtained. Details of existing services at each of the proposed CGSJs and on the mainline have also been obtained from utility providers for consideration.

16.1.3 The local area development plans have been reviewed to establish the potential effect on Areas of Mineral Constraint.

16.1.4 All relevant scoping responses have been duly considered within this assessment.

16.2 Findings

Gas Disruption

Phoenix Gas:

16.2.1 There will be no effect to Phoenix Gas services as part of the proposed development. Currently Phoenix Gas are extending their services east towards Hillsborough and Dromore utilising the local road network, rather than the A1 mainline corridor. The gas main currently crosses the A1 at, LILO 21, Moira Road, but has sufficient cover that it will not be affected by the reconfiguration of the Moira Road junction.

16.2.2 Pre-mitigation the predicted magnitude of impact is predicted to be no change.

Firmus Gas:

16.2.3 Firmus Gas infrastructure currently runs from the Rathfriland Road Junction to Kilmacrew Road, with a spur serving old Manse Road in Banbridge. The construction of the new Castlewellan Road On slip at Junction 6 may require the existing gas main to be lowered and locally relocated for approx. 150m to facilitate construction of the proposed retaining structure for the new slip road, subject to further detailed design and construction method employed by the contractor. The existing gas main at LILO 4, Old Manse Road should have adequate existing cover to protect it from the reconfiguration works.

16.2.4 At Junction 5, Waringsford Road, approximately 200m of existing gas main will need to be diverted to ensure that the existing infrastructure is located within the realigned verge and to provide adequate clearance for the construction of the bridge foundations. It has been noted that it is important to maintain the gas supply to the two quarries at Waringsford and that efforts should be made to minimise disruption.

16.2.5 The provision of a merge lane at LILO 7, Kilmacrew Road will require the relocation of approx. 250m of gas main from the old verge into the new verge to provide adequate cover and safe access to the valves located in this area for maintenance purposes.

16.2.6 Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse.

Electricity supply

16.2.7 There is a range of NIE services located within the A1 transport corridor consisting of Low Voltage (Lv), (Medium Voltage (Mv) and High Voltage (Hv) overhead and underground lines. The construction of the CGSJs and the conversion of existing junctions to LILO will require the relocation of overhead pole lines, the raising of existing overhead lines or the lowering/ burial of new power lines. Meetings with the utility provider indicated that the majority of junction locations would have an effect to the existing infrastructure.

16.2.8 Junctions 1-5 will mostly require the modification to Mv and Lv lines by either lowering the existing lines or relocating the pole routes away from the new junctions. Junction 5 Waringsford Road is the most complex junction as it will require the relocation of 1 no substation in addition to Lv, Mv and Hv cables, which is currently adjacent to the entrance of Tullyraine Quarry.

16.2.9 The reconfiguration of the side roads will require the relocation of several poles as the road running lanes will now be closer to the pole line increasing the risk to road users. This will be required at locations such as LILO 9, Mount Ida Road, LILO 5, Lisnaree Road and LILO 15, Grove Road. Furthermore it may be necessary to lower short

sections of buried cables to maintain cover depths between the proposed road level and cable. It is envisaged that any existing or relocated poles will be protected by safety barrier if a Roads Restraints Risk Assessment Process identifies the poles as a risk to road users. Of note is that the closure of gaps in the central reserve will require the removal of two existing poles from the central reserve to the north and south of the Milebush Road central reserve gap, LILO 17. These poles have each been struck in the recent past (2016 and 2017), resulting in injury to the car driver in both instances. Where existing NIE services cross the carriageway it would be preferable to convert these to underground services rather than raise or extend the overhead line span across the carriageway.

16.2.10 Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse.

Mains water, surface water and foul sewers

16.2.11 A water main is present along the A1 throughout the study area. This is shown as being in the verge, where it regularly switches between the northbound and southbound verge. There are also water mains located in the verge of most of the public side roads. Discussions have been held with NIW in relation to the impact to existing infrastructure as a result of the proposed road works. Work at the CGSJs will largely involve the laying of new replacement mains parallel to the new roads and the installation of new infrastructure to ensure that the pipework and valves can be accessed easily and safely in the vicinity of the new junctions. For example, Junction 3 will require the existing historic mains adjacent to the existing road to be terminated and new pipework provided within the verge of the realigned Gowdystown East and West Roads and the connector road which connects onto the former Banbridge Road.

16.2.12 The works associated with the side roads will require a combination of localised raising of manhole covers, lowering of existing pipework to maintain adequate cover or relocation of the existing main from the existing verge to the new verge due to the widening of the existing road corridor to accommodate diverge/merge lanes. For example, side road junctions such as LILO 12, Lower Quilly Road where the junction is being widened to accommodate the new splitter island, will require the existing main to be lowered and realigned to ensure adequate cover levels and that the valves located at this location have been positioned in the new verge to facilitate safe access.

16.2.13 Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse.

Telecommunications

British Telecom

16.2.14 BT currently maintains both underground and overhead infrastructure along the A1. These are typically overhead cables in rural areas but in the more densely populated areas, such as Hillsborough, Dromore, Banbridge and Loughbrickland, the apparatus is contained within a buried duct. At each of the grade separated junction locations, existing overhead lines will be buried and laid in the verge of the new road sections where required. The existing BT fibre optic services located in the existing verges will need to be protected for the duration of the works due to the high cost of relocating these services. This was successfully undertaken during the A1 Junctions Phase 1 Project.

16.2.15 The conversion of the side road junctions to LILO will require the relocation of manhole covers and conversion of verge type boxes to road boxes where necessary. In addition, to maintain adequate cover and safe access to the service, several sections may need to be lowered or routed away from the road into the new verges. For instance LILO 15, Grove Road will require the removal of the existing overhead BT line, which will be relocated underground in a duct to accommodate the new LILO junction layout.

16.2.16 Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse.

Minerals

16.2.17 There are a number of extractive quarries in the immediate vicinity of the proposed development at Banbridge. The proposed development is not directly located on an Area of Mineral Constraint nor directly impacts on any mineral reserves.

16.2.18 Pre-mitigation the predicted magnitude of impact is predicted to be no change.

16.3 Mitigation

16.3.1 Methods such as specialist survey equipment and excavations in the grass verge areas will be used to verify and locate existing services and offset potential effects. Where direct impact on services cannot be avoided agreements will be made with the service provider to relocate or lower the services.

16.4 Conclusions

16.4.1 There is no direct impact on any Phoenix Gas services. The predicted significance of effect will be no change.

16.4.2 With the implementation of the mitigation measures above and also close liaison with Firmus Gas during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse to negligible.

16.4.3 With the implementation of the mitigation measures above and also close liaison with NIE during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse to minor beneficial.

16.4.4 With the implementation of the mitigation measures above and also close liaison with NIW during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse to negligible.

16.4.5 With the implementation of the mitigation measures above and also close liaison with BT during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse to minor beneficial.

16.4.6 There is no direct impact on any Areas of Mineral Constraint. The predicted significance of effect will be no change.

17 VEHICLE TRAVELLERS

17.1 Methodology

View from the Road

17.1.1 "View from the road" is defined in DMRB Volume 11 Section 3 Part 19 as "the extent to which travellers, including drivers, are exposed to the different types of scenery through which a route passes". The following are to be considered:

(a) Types of scenery or the landscape character as described and assessed for the baseline studies;

(b) Extent to which travellers may be able to view the scenery;

(c) Quality of the landscape as assessed for the baseline studies; and

(d) Features of particular interest or prominence in the view.

Driver Stress

17.1.2 Driver stress is defined in the DMRB for environmental assessment purposes as the "adverse mental and physiological effects experienced by a driver traversing a road network". Factors that influence stress levels include:

- Road layout;
- Geometry;
- Surface riding characteristics;
- Junction frequency; and
- Speed and flow per lane.

17.1.3 For drivers, these factors can cause a feeling of discomfort, annoyance, frustration or fear, resulting in physical and emotional tension. Driver fear is also caused by the imposing presence of other vehicles and inadequate sight distances and poor road surfacing. Fear is highest when speeds, traffic flows and the proportion of HGVs are all high, and these factors become more important in adverse weather conditions

17.1.4 The level of stress experienced will vary between individuals, depending on characteristics such as skill, experience, temperate and knowledge of the route.

17.1.5 Research into driver behaviour indicates that there is a drop in driving standards with increased driver stress and drivers tend to become more aggressive towards other road users. In addition, increasing driver fatigue results in a diminished response to visual and other stimuli.

17.2 Findings

17.2.1 During the construction stage of the proposed development there is potential for any required road closures or temporary diversions to give rise to increases in drivers stress. Similarly temporary speed limit reductions may increase driver stress and negatively impact on journey reliability.

17.2.2 Following completion of the proposed development journey reliability is expected to increase due to the safety improvements with a Large or Very Large Beneficial Significant Effect.

17.2.3 Driver stress will improve and it is anticipated that frustration, fear of potential accidents and uncertainty will greatly reduce as a result of the proposed development with a Large or Very Large Beneficial Significant Effect.

17.2.4 Views from the road will predominantly be retained for vehicle travellers with new junctions landscaped with a Large or Very Large Beneficial Significant Effect.

17.2.5 The proposed development will have a large or very large beneficial effect for vehicle travellers.

17.3 Mitigation

Views from the road

17.3.1 A number of measures will be implemented to minimise the impact on views from the road:

- Views from the road to be retained or enhanced where possible;
- Signage location sympathetic to rural and sensitive areas;
- Where possible, open parapets on bridges to maximise view from the road and to reduce visual impact;
- Where possible, areas of rock cuttings as a natural feature;
- Hard features and planting at junctions to create gateways; and

- Where appropriate at new boundaries on agricultural land, timber post and wire stock fencing will be used.

Driver Stress

With regards to disruption due to construction a traffic management plan for the construction stage will be developed prior to commencement of works and the following points can be made at this time:

- Road closures and diversions will be minimised and take place during off peak times to limit route uncertainty and thus driver stress; and
- Although any temporary reduction in speed limit may increase driver stress, adequate signage will be provided at all times to encourage free flow of traffic.

17.4 Conclusions

17.4.1 Following completion of the proposed development and implementation of mitigation measures driver stress, journey reliability and views from the road will all be beneficially effected.

17.4.2 Overall the proposed development will have a large or very large beneficial effect for vehicle travellers.

18 OVERALL CONCLUSION

18.1.1 The EIAR summarises the environmental assessment carried out in accordance with National and European regulatory requirements.

18.1.2 The environmental assessment has been undertaken following the standard methodologies set out in the DMRB Volume 11 (Environmental Assessment).

18.1.3 The gathering of baseline environmental data and subsequent assessment of the potential environmental impacts of the proposed development have been used to develop appropriate mitigation measures. Many of these mitigation measures are incorporated into the design of the proposed development and reduce the impacts of the proposal.

18.1.4 It is accepted that the proposed development would have various adverse environmental impacts, however given the nature and scale of the proposed development, with mitigation measures in place, it can be concluded that on balance these impacts overall are acceptable and the proposed development integrates relatively well into the existing environment along the A1 corridor.