13 CLIMATE AND GREENHOUSE GASES

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13 CLIMATE AND GREENHOUSE GASES

13.1 Introduction

This chapter of the ES provides the relevant legislative and policy context, an overview of the assessment methodology, baseline climate data, incorporated mitigation and additional mitigation measures in relation to climate and greenhouse gases. The effective assessment and management of impacts on climate, as well as the effects of climate change on projects provides the opportunity to:

- improve the resilience of projects to future climate conditions, such as increased risk and severity of flooding, drought, heatwaves, intense rainfall events and other extreme weather events; and,
- reduce the impact of projects on climate by minimising the magnitude of greenhouse gas ("GHG") emissions.

Under The Planning (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 (the '2017 EIA Regulations'), applicants are required to include in the ES:

> *"a description of the likely significant effects of the development resulting from, inter alia: […] the impact of the development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the development to climate change"*

Climate change in the context of Environmental Impact Assessment (EIA) can be considered broadly in two domains: the impact of greenhouse gases (GHGs) caused directly or indirectly by the Proposed Development, which contribute to climate change; and the potential impact of changes in climate to the development, which could affect it directly or could modify its other environmental impacts.

Chapter 2 of this ES details the Proposed Development and methods of construction in full and it is not repeated in this chapter.

Volume III Appendix 13.1 contains further detail about the projected climatic changes and potential risks to the Proposed Development during its lifetime. There are also potential inter-relationships between climate change and several other environmental topic areas reported in other chapters of this ES, most notably flood risk.

13.2 Legislative, Policy Framework and Guidance

13.2.1 Design Manual for Roads and Bridges (DMRB)

DMRB guidance on climate change was published on 31 October 2019 under the heading LA 114 – Climate. This guidance aligns the DMRB assessment process more closely with the 2017 EIA Regulations. Although specifically related to highway schemes it can be referenced in this assessment with regard to emissions and also is aligned with guidance as presented in the Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas (GHG) Emissions and Evaluating their Significance.

The LA 114 document was created to set out the requirements for assessing and reporting the effects of climate on highways (climate change resilience and adaptation), and the effect on climate of greenhouse gas from construction, operation and maintenance of road/highway[1] projects.

LA 114 advises to report on the likely additional and avoided GHG emissions at each life cycle stage of the project, in comparison with current and future baseline GHG emissions. The nature and scale of GHG emissions (positive, neutral or negative) and the likelihood of significant effects should be reported in accordance with the LA 114 guidance document.

[1] Although specific to road schemes, the criteria for assessment is a useful gauge in determining whether an assessment is required for construction and operational phases of Proposed Developments.

Two main questions are posed in order to gain an understanding of the need to undertake further assessment, those are:

- are construction GHG emissions (or GHG-emitting activity), compared to the baseline scenario (i.e. when compared to GHG emissions and energy use associated with existing maintenance activities), increasing by >1%; and,
- during operation, will roads meet or exceed any of the following criteria:

  a) a change of more than 10% in AADT;

  b) a change of more than 10% to the number of heavy duty vehicles; and,

  c) a change in daily average speed of more than 20 km/hr.

If the answer is 'yes' to either of these questions then further assessment is recommended. In terms of the Proposed Development the answer is 'yes' to the construction GHG emissions increases but 'no' to the operational criteria. Therefore the operational phase DMRB road assessment can be screened out as impacts are not deemed to be significant – although the approach to assessment is still set out and confirmation of screening out the operational phase assessment is detailed as required in this chapter.

The key anticipated GHG emissions sources during construction of the Proposed Development are presented in Table 13.1 Anticipated GHG Emission Sources – Construction.

Table 13.1 Anticipated GHG Emission Sources – Construction (DMRB)

Lifecycle stage	Activity	Primary emission sources
Product Stage	Raw material extraction and manufacturing of products/ materials.	Embodied GHG emissions.
	Transport of products/ materials to site.	Emissions from fuel used for the transportation of products/materials to site.
Construction Process Stage	On-site construction activity.	GHG emissions from fuel consumption by vehicles, plant and equipment for construction of the Proposed Development.
	Transport of construction workers.	Emissions from fuel used for worker commuting.
	Disposal of construction waste.	GHG emissions from fuel used for the transport and disposal of waste.

13.2.1.1 Key Anticipated GHG Emission Sources – Operation

The key anticipated GHG emissions sources during the operational, maintenance and use phases of the Proposed Development are presented in Table 13.2 Key Anticipated GHG Emission Sources – Operation.

Table 13.2 Key Anticipated GHG Emission Sources – Operation (DMRB)

Lifecycle stage	Activity	Primary emission sources
Operational stage	Vehicle journeys.	GHG emissions from fuel consumption by vehicles.

The operational phase does not meet criteria regarding emissions from vehicles and may be screened out. Chapter 15 of this ES detailed vehicle movements and predicted traffic volumes.

13.2.2 Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance

IEMA published this guidance to assist practitioners with addressing greenhouse gas (GHG) emissions assessment and mitigation in statutory and non–statutory EIA. The guidance indicates that a 'good practice'

approach is advocated where GHG emissions are always considered and reported but at varying degrees of detail depending on the project.

The guidance sets out there are a number of different assessment methods available for measuring and quantifying the GHG emissions associated with the built environment, ranging from general guidance to form standards for the use of an EIA. The Guidance recognising that:

> *'qualitative assessments are acceptable, for example: where data is unavailable or where mitigation measures are agreed early on in the design phase with design and engineering teams'.*

The assessment in this Chapter presents a qualitative assessments and discussion in terms of GHG emissions.

13.2.3 Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation

The Guide to Climate Change Resilience and Adaptation (June 2020) provides an updated framework for the effective consideration of climate change resilience and adaption in the EIA process). This document is a revision of the 2015 IEMA guidance on Climate Change Resilience and Adaption in EIA and reflects lessons learnt from emerging practice.

A step by step method presented within this guidance is set out below and has been given due cognizant within this Chapter:

- Step 0 – Building climate resilience into the project by considering incorporating resilience during the designs stage and by identifying appropriate mitigation measures;
- Step 1 – Scoping for the EIA; e.g. identify the climate change projections for use in the assessment and identify key climatic variables relevant to the project;
- Step 2 – Defining the future (climate) baseline; define future conditions using selected climate change projections (i.e. increase in rainfall, increase in mean summer temperature and wind strength);
- Step 3 – Identifying and determining sensitivity of receptors;
- Step 4 – Reviewing and determining magnitude of the effect; consider probability and consequence to determine the magnitude of the effect;
- Step 5 – Determination of significance;
- Step 6 – Developing additional adaptation / EIA mitigation measures;
- Step 7 (Development permitted) – Monitoring and adaptive management by implementing mitigation measures.

EIA Reports produced in line with this guidance are to be proportionate in their approach and not include superfluous assessment that does not address likely material issues.

In lieu of a prescribed methodology, IEMA guidance on Climate Change Resilience and Adaptation (2020) has been prepared to assist practitioners with the effective consideration *"of both climate change resilience and adaptation in the EIA process"*.

The guidance stresses that climate change should be an integrated consideration within the EIA, by undertaking an assessment that is *"proportional to the evidence base available to support any assessment"* and focusses on impacts *"specific to project".*

13.3 Assessment Methodology

13.3.1 General Approach

'Climate' is generally understood to mean the weather conditions prevailing over a long period of time and climate change refers to changes in recorded long term climate trends. As a topic for the assessment within EIA, climate change is relatively new. Guidance is evolving and there is no prescribed way in which climate change should be

incorporated into an ES, however, some guidance has been prepared by IEMA, discussed further below, which sets out the two main approaches that can be taken to determine a project's climate change impact.

These involve identifying:

- The vulnerability of the Development to climate change; and
- The direct and indirect influence on the Development on climate change.

The vulnerability of the Development to climate change considers effects on the Development as a receptor (this is referred to in IEMA Guidance as Climate Change Resilience and Adaptation). A high level climate change risk and resilience assessment has been undertaken to identify the potential risks of climate change on the Development and to high design measures to increase its resilience and adaptation to climate hazards, such as extreme hot and cold weather, intense rainfall, high winds and storm events.

Direct and indirect effects consider effects on environmental receptors as a result of the Proposed Development. Direct and indirect emissions can be defined as follows:

- Direct GHG emissions are emissions from sources that are owned or controlled by the operator. Examples include vehicular emissions, plant use (such as generators) and independent onsite energy generation (oil, gas and diesel);
- Indirect GHG emissions are emissions that are a consequence of the construction of operational activities of the Development but are a result of procurement and / or activities controlled by another entity. Examples include energy generation and the manufacture of materials (known as 'embodied' carbon).

13.3.2 Significance of Effect

In the absence of any significance criteria or a defined threshold, it might be considered that all carbon emissions are significant and beneficial effects only arise if there is a net loss in carbon and emissions. As per the IEMA Guidelines, when evaluating significance, all new GHG emissions contribute to a significant negative environmental effect.

The significance of a project's emissions should be based on its net impact, which may be positive or negative, EIA should ensure an assessment addresses the occurrence of GHGs by taking mitigating action. Whilst there is no single preferred method to evaluate significance of effects given this topic is emerging within EIA, the approach to determining the significance of effects has applied available guidance, standard industry practice and profession judgement.

There is currently no industry–wide agreed threshold of carbon emissions which, if exceeded, can be defined as significant or potentially significant. The 2017 IEMA Guidance acknowledges that all emissions could lead to cumulatively significant effects. The IEMA Guidance (2017) notes that the cumulative impact of carbon emissions arising from global human activity is considered major however, the contribution from individual developments, such as the Development in this ES, could be considered negligible / low in the context of the UK's emissions since, in isolation, the quantity of carbon emissions from an individual development is likely to have limited potential to significantly increase atmospheric carbon emissions towards global environmental targets.

13.3.3 Climate Change Resilience

The identification and assessment of climate change resilience within EIA is an area of emerging practice. There is no single prescribed format for undertaking such assessments; therefore, the approach adopted to undertaking and reporting the assessment has drawn on good practice from other similar developments and studies.

The types of receptors considered vulnerable to climate change are:

- construction phase receptors (i.e. workforce, plant and machinery);
- the development's assets and their operation, maintenance and refurbishment (i.e. hardstand, structures, earthworks and drainage, etc.); and,
- end-users (i.e. members of public and commercial operators etc.).

The 40-year design life (Wood pole replacement occurs every 30-40 years) of the Proposed Development includes its construction and operational phases. As the construction phase would be much shorter in duration than the operational phase, future climate change is less relevant to the assessment of construction impacts and effects. Accordingly, the construction assessment has followed a descriptive based approach. For the operational assessment, the likelihood and consequence of impacts and effects on receptors has been assessed based on a future time frame of operation.

Criteria used to determine the likelihood of an event occurring, based on its probability and frequency of occurrence, are detailed in Table 13.3 Measure of Likelihood for Climate Change Resilience Assessment.

Table 13.3 Measure of Likelihood for Climate Change Resilience Assessment (Source: DMRB)

Likelihood Category	Description (probability and frequency of occurrence)
Very High	The event* occurs multiple times during the lifetime of the project e.g. approximately annually, typically 60 events.
High	The event occurs several times during the lifetime of the project e.g. approximately once every five years, typically 12 events.
Medium	The event occurs limited times during the lifetime of the project e.g. approximately once every 15 years, typically 4 events.
Low	The event occurs during the lifetime of the project.
Very low	The event may occur once during the lifetime of the project.

** The event is defined as the climate event (such as heatwave) and the hazard (such as overheated electrical equipment) occurring in combination.*

The consequence of an impact has been measured using the criteria detailed in Table 13.4 Measure of Consequence for Climate Change Resilience Assessment.

Table 13.4 Measure of Consequence for Climate Change Resilience Assessment (Source: DMRB)

Consequence of Impact	Description
Very Large Adverse	National level disruption lasting more than 1 week.
Large Adverse	National level disruption lasting more than one day but less than 1 week.
Moderate Adverse	Regional level disruption lasting more than one day but less than 1 week.
Minor Adverse	National level disruption lasting less than 1 day.
Negligible	Isolated disruption lasting less than 1 day.

The identification of likely significant effects on receptors has been undertaken using professional judgement by combining the measure of likelihood with the predicted consequence of impact, as shown in Table 13.5 'Significance Criteria for Climate Change Resilience Assessment'.

Table 13.5 Significance Criteria for Climate Change Resilience Assessment

Consequence of Impact	Measure of Likelihood				
	Very Low	Low	Medium	High	Very High
Negligible	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant
Minor	Not Significant	Not Significant	Not Significant	Significant	Significant
Moderate	Not Significant	Not Significant	Significant	Significant	Significant
Large	Not Significant	Significant	Significant	Significant	Significant
Very Large	Not Significant	Significant	Significant	Significant	Significant

The assessment of potential impacts and the Proposed Developments vulnerability takes into account the mitigation measures that have been designed into the Proposed Development, as discussed in Section 13.6 Mitigation.

The assessment also identifies and accounts for existing climate change resilience measures either already in place or in development for infrastructure and assets, for example, mitigation measures for potential flooding impacts on the Proposed Development.

13.3.4 Assessment Criteria and Assessment of Significance

13.3.4.1 Assessment of GHG Emissions

The main emissions sources of the Proposed Development that have been considered are:

- As with the majority of large civil engineering projects potential emissions to air are inevitable during the construction phase, arising from construction activities, transport of materials and the use of plant and equipment.
- other inputs, primarily electricity and heat load; and,
- The decommissioning of the Proposed Development. The decommissioning phase is not considered due to the long design life of the assets and given that emissions with the end of the life of this type of asset are relatively small and therefore unlikely to be significant.

13.3.4.2 Assessment of Climate Risks

The assessment assumes the Development will be fully operational from 2025. In considering future climate change scenarios, managing climate change resilience and adaption, the IEMA guidance (2020) recommends the use of the UK Climate Projections (UKCP) Website (Met Office, 2018). The latest UKCP is UKCP18 which provides updated observations and climate change projections out to 2100 in the UK. Therefore, this assessment assumes projections for the 2100 as the most far-reaching projection and is considered to be appropriate for the design life of the Development.

In order to consider the impact of the changing future climate upon the Proposed Development, probabilistic projections of change in climatic variables over time under several potential future global emissions scenarios published by the Met Office have been used. These projections have informed a high-level assessment of risks to the Proposed Development from climate change in the course of its lifetime, and potential design responses to adapt or increase resilience. Further details of the climate projections and the risk assessment approach are contained Volume III Appendix 13.1.

13.3.4.3 Sensitive Receptors

Following identification of the future climate scenarios, the project receptors within the study area which are vulnerable to climate change may be identified as below:

- the construction process (e.g. workforce, plant, machinery etc);
- the assets and their operation, maintenance and refurbishment (e.g. structures, substations, underground cables, etc); and,
- end-users (e.g. members of public, commercial operators etc).

13.3.5 Extent of Study Area

For construction and operational maintenance, the study area shall comprise GHG emissions associated with project construction related activities/materials and their associated transport. For operational road user GHG emissions, the study area shall be consistent with the affected road network defined in a project's traffic model. The data available to allow an assessment of greenhouse gas emissions from vehicle movements associated with the Development is limited to the study area of Chapter 15 Traffic of the ES.

The climate change impact is assessed as the difference between the carbon emissions associated with the baseline and that associated with the fully completed Development. The study area for carbon emissions assessment is defined by the red line site boundary and the transportation network considered in Chapter 15 Traffic.

13.3.6 Consultation

The consultation process is set out in Chapter 2, no additional consultation has taken place in relation to climate change. A summary of all consultation with stakeholders or consultees (such as local planning authority) is provided in the table below.

Table 13.6 Consultation Responses

Date	Consultee and issue raised	How and where addressed in the ES
Throughout all consultation stages to date (April 2021)	No response was made in relation to climate from the local authorites Environmental Health Department.	The ES chapter is produced in accordance with relevant guidance as detailed and outlined in the chapter.

13.4 Baseline Environment

13.4.1 Existing GHG Northern Ireland - Greenhouse Gas Statistical Bulletin – September 2020 (DAERA, 2020)

The Northern Ireland Greenhouse Gas (GHG) Inventory contains data which details GHG emissions from Northern Ireland from 1990 to the latest reporting year. It is a subcategory of the UK GHG Inventory, which is produced to satisfy both European Union Monitoring Mechanism (EUMM) and United Nations Framework Convention on Climate Change (UNFCCC) reporting requirements the UK has responsibility for under the Kyoto Protocol. It is compiled in line with international guidance from the IPCC.

Published on 30th September 2020 the GHG statistical bulletin, the Northern Ireland greenhouse gas inventory 1990 – 2018 details information about greenhouse gas emissions in 2018. The volume of emissions is reported for seven greenhouse gases:

- carbon dioxide (CO_2);
- methane (CH_4);
- nitrous oxide (N_2O);
- hydrofluorocarbons (HFCs);
- perfluorocarbons (PFCs);
- sulphur hexafluoride (SF_6); and,
- nitrogen trifluoride (NF_3).

In 2018, Northern Ireland's GHG emissions were estimated to be 19.4 million tonnes of carbon dioxide equivalent. This was a decrease of 2.5% compared to 2017. The longer term trend showed a decrease of 20% compared to the base year (1990). The base year is 1990 for carbon dioxide, methane and nitrous oxide, and 1995 for the fluorinated gases.

Most sectors showed a decreasing trend since the base year. The largest decreases, in terms of tonnes of carbon dioxide equivalent, were in the energy supply, residential and waste sectors. These were driven by improvements in energy efficiency, fuel switching from coal to natural gas, which only became available in the late 1990s, and the introduction of methane capture and oxidation systems in landfill management.

Between 2017 and 2018, emissions from the energy supply sector decreased by 14.5% and accounted for most of the total decrease. This is due to a reduction in coal-and gas-fired power generation in Northern Ireland. The transport, land use change and agriculture sectors showed higher emissions in 2018 than in the base year.

The proportions of each gas for Northern Ireland are shown in Figure 13.1. Carbon dioxide was the most common gas emitted across all sectors except for agriculture and waste management. For the agriculture sector, methane from livestock and nitrous oxide from soils were more significant greenhouse gases than carbon dioxide. Methane from landfill was the main greenhouse gas from the waste management sector.

Figure 13.1: Greenhouse gas (GHG) emissions by gas in Northern Ireland, 2018 (DAERA, 2020)

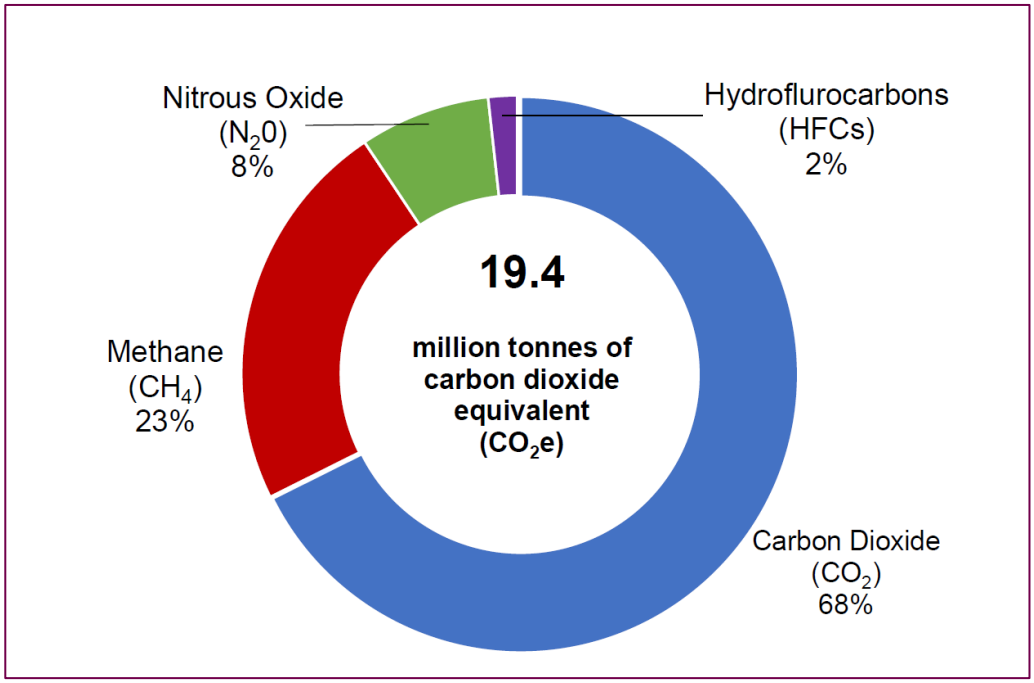


Table 13.7 Total greenhouse gas emissions by sector in Northern Ireland: Base Year, 2017 & 2018 (DAERA, 2020)

Sector	Base Year	2017	2018	% change base year to 2018	% change 2017 to 2018
Agriculture	5.3	5.4	5.3	0.8	*-1.7*
Business	3.1	2.4	2.4	*-22.9*	*-3.7*
Energy Supply	5.3	3.4	2.9	*-44.9*	*-14.5*
Industrial Process	0.8	0.2	0.2	*-77.1*	5.6
Land Use Change	0.4	0.5	0.5	32.5	5.6
Public	0.5	0.1	0.2	*-68.7*	6.6
Residential	3.7	2.6	2.7	*-25.6*	5.2
Transport	3.5	4.5	4.5	28.5	*-1.4*
Waste Management	1.9	0.7	0.8	*-57.8*	9.9
Total	24.3	19.9	19.4	-20.0	-2.5

The largest sectors in terms of emissions in 2018 were agriculture (27%), transport (23%) and energy supply (15%).

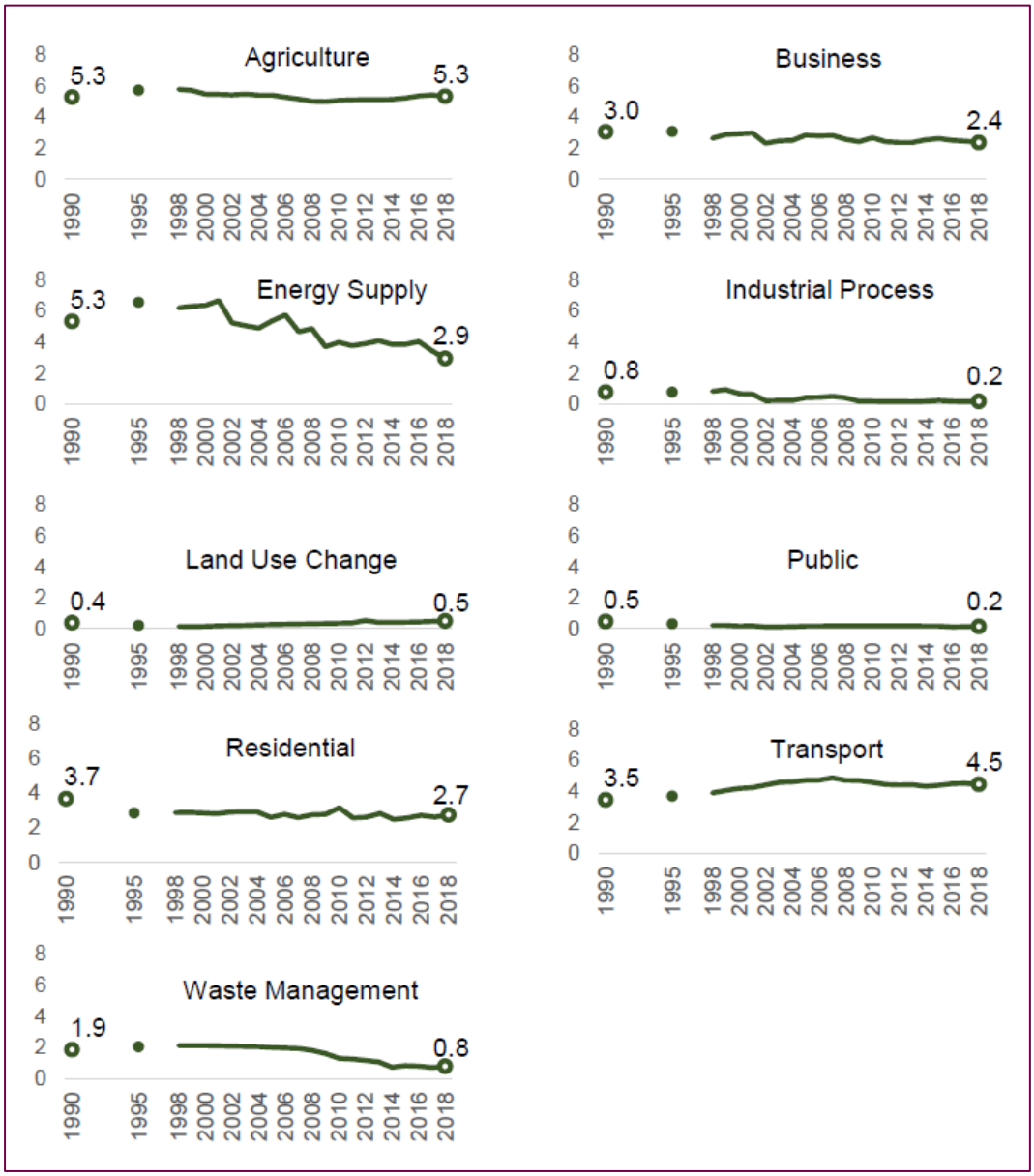
Between 2017 and 2018, emissions from the energy supply sector decreased by 14.5% and accounted for most of the total decrease. This is due to a reduction in coal-and gas-fired power generation in Northern Ireland.

The performance towards targets are:

- The UK Climate Change Act 2008 introduced a legally binding target to reduce GHG emissions by at least 80% below the 1990 baseline by 2050. To meet these targets, the government has set five-yearly carbon budgets which currently run until 2032.
- The UK is currently in the third carbon budget period (2018 to 2022) which has a target to reduce emissions by 37% by 2020 (on 1990 levels). The fourth and fifth carbon budgets have targets of 51% by 2025 and 57% by 20301. In 2019, The Act was amended to require the UK to have a 100% reduction in greenhouse gas emissions by 2050 from 1990 levels, commonly referred to as the ‘net zero 2050’ target.
- The trends in greenhouse gas emissions vary across the different parts of the UK between the base year and 2018. It should be noted that the regional estimates are less certain than the overall UK estimate.
- In 2018, Northern Ireland’s greenhouse gas emissions were estimated to be 19.4 MtCO2e.

Figure 13.2 shows GHG emissions by sector in Northern Ireland from 1990 to 2018.

Figure 13.2: Greenhouse gas (GHG) emissions in MtCO2e by sector in Northern Ireland, 1990, 1995, 1998-2018 (DAERA, 2020)



Total greenhouse gas emissions for Northern Ireland in 2018 in the end user inventory were 19.7 $MtCO_2e$. Four sectors accounted for 90% of end user emissions in 2018. These were agriculture (28%), transport (25%), residential (19%) and business (18%).

The greenhouse gas emission estimates are based on a wide range of data sources and sources of uncertainty including statistical differences, assumptions, proxy datasets and expert judgement. In addition, the natural variability in the processes that are being modelled introduce uncertainty. For example, carbon content of fuels and farming practices under different climatic conditions and soil types. The uncertainties are presented as confidence intervals. The width of the interval provides a measure of the accuracy of the estimate. (Statistics and Analytical Services Branch, Department of Agriculture, Environment and Rural Affairs, June 2018).

Uncertainty estimates for Northern Ireland emissions are available for the base year, the latest year (2018) and for the percentage change between the two years. For the base year, the 95% confidence interval is ±10%, and for 2018 it is ±7%. For the percentage reduction between the base year and 2018, the 95% confidence interval ranges from 11% to 31%, with a central estimate of 15.9%. There remains greater uncertainty around emissions in Northern Ireland compared to other parts of the United Kingdom due to the relative importance of nitrous oxide emissions in the agriculture sector. Emissions of this gas are more difficult to estimate than carbon dioxide, and the agriculture sector makes up a larger share of Northern Ireland's emissions than in other parts of the UK.

Carbon dioxide was the most common gas emitted across all sectors except for agriculture and waste management. For the agriculture sector, methane from livestock and nitrous oxide from soils were more significant greenhouse gases than carbon dioxide. Methane from landfill was the main greenhouse gas from the waste management sector. Energy supply has dropped steadily from 1990 to 2018.

13.5 Impact Assessment

13.5.1 GHG Impact Assessment - Construction Impacts

The below definitions of the terms effect and impact are drawn from the glossary of the Highways Agency Design Manual for Roads and Bridges, which provides general guidance:

- **Impact:** Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact);
- **Effect:** Term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.

The term impact is used when discussing impact magnitude – the original impact on a receptor. The term effect is used when talking about significance (as this is the result of the impact and the sensitivity of the receptor). The following are set out:

- Magnitude of impact;
- Sensitivity of receptor;
- Significance of effect.

In terms of the Proposed Development the following key aspects are summarised:

- Increased frequency of extreme weather - Damage, delay, health and safety impact, increased costs. The sensitivity of construction phase receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be minor.
- Increased temperatures, prolonged periods of hot weather - Warm and dry conditions exacerbate dust generation and dispersions, health risks to construction workers. Appropriate dust control measures will be put in place during the construction phase of the Proposed Development to aid in protection from fugitive dust dispersion and potential health impact on construction workers (Chapter 12 details mitigation measures in relation to dust during the construction phase).
- Increased precipitation, and intense periods of rainfall. 1) Flooding of works and soil erosion; 2) Increased risk of contamination of waterbodies; 3) Disruption to supply of materials and goods; 4) Landslides. Appropriate assessment has been undertaken in relation to future flooding. Please refer to Chapter 10 for full assessment details of future flood risk.

The sensitivity of construction phase receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be negligible.

13.5.2 Climate Change Resilience – Construction Impacts

In relation to emissions from construction traffic, conservative 'worst-case' estimates of cumulative traffic for the construction phase traffic are provided in Table 2.2 (in Chapter 2 Project Description); it is envisaged that the total traffic will be significantly less than the figures stated. It is envisaged that the total time to complete construction will be in the region of 12-18 months.

During the construction process, receptors may be vulnerable to a range of climate risks. These are addressed by the mitigation measures in Section 13.6. Potential impacts during the construction phase could include:

Inaccessible construction site due to severe weather events (flooding, snow and ice, storms) restricting working hours and delaying construction;

Health and safety risks to the workforce during severe weather events;

Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities; and,

Damage to construction materials, plant and equipment, including damage, material storage areas and worksites, for example from stormy weather.

With regard to climate change risks to the Proposed Development during the construction period, Volume III, Appendix 13.1 summarises potential changes in climatic parameters from 2020 onwards. It is considered reasonable that construction contractors would be able to adapt working methods if necessary.

For example, warmer winter conditions may extend the time certain construction activities such as concrete pouring can be carried out, while a greater chance of summer heatwave conditions may require adaptations such as shading work areas or increased attention to construction dust control measures. Effects are considered to be negligible and not significant.

13.5.3 Peat and Carbon Dioxide Release

In addition to the combustion of fossil fuels, greenhouse gases are also released through natural processes such as the decomposition of organic material (which is composed of carbon). Bogs and peatlands are known to store large amounts of carbon. Chapter 7 Terrestrial Ecology & Ornithology details pole locations and habitat type and also detail mitigation measures for impact on habitats. It should be noted that in locations of pole erection, the peat is not “lost” it is “disturbed”, set to the side and then replaced around the base of the pole.

Excavation works will temporarily remove and set aside top soil, excavate the foundation for the pole and then backfill and compact the foundation of the pole. All excavated material will be used as backfill, with no imported backfill being required or spoil to be removed from the site.

Chapter 7 Terrestrial Ecology & Ornithology quantifies the total footprint in each of the respective Northern Ireland Priority Habitats across the entire 33kV distribution line project. It is proposed to compensate for these damaged habitats through restoration / enhancement measures of existing peatland habitats. Compensation for the habitats as set out in Chapter 7, additional to that proposed by the Curraghinalt Project ES (SRK 2017) for the planning application for the Proposed Curraghinalt mine, will be provided on other land within the control of Dalradian Gold Ltd and this can be secured by way of negative planning condition or Planning Agreement.

13.5.4 Assessment of Operational Effects

The data available to allow an assessment of greenhouse gas emissions from vehicle movements associated with the Proposed Development is in the ES Chapter 15. The changes in regional emissions from traffic as a result of the Proposed Development were considered in the context of total UK emissions provided by the National Atmospheric Emissions Inventory (NAEI). The consideration of significance of the Proposed Development’s impact on regional emissions was undertaken using professional judgement considering the change predicted and the sensitivity of the national (UK) total to change, with the outcome assessed as either Significant or Not Significant. Operation and maintenance traffic will only include light commercial vehicles and is estimated to consist of an average of 6 trips per year to various points along the 37.9km route.

The operational phase DMRB road assessment can be screened out as impacts are not deemed to be significant given that the criteria set out in section 13.2.1 of this chapter are not met.

Assessment has been undertaken in relation to future flooding. Please refer to Volume I Chapter 10 Flood Risk of this ES for full assessment details of future flood risk. Mitigation measures are outlined in Chapter 10 and are not repeated here.

The sensitivity of operational receptors is considered to be high. The magnitude of change is considered to be negligible in national UK terms. Therefore the changes in traffic emissions are negligible and not significant.

13.5.5 Climate Change Resilience – Operational Impacts

The Proposed Development also has the potential to be impacted upon by a changing climate and, in particular, more frequent severe weather events, in the medium to longer-term. These are addressed by the mitigation measures in Section 13.6. Potential impacts on the Proposed Development during the operational phase include:

- Material and asset deterioration due to high temperatures;
- Health and safety risks to road users;
- Damage to roads from periods of heavy rainfall; and
- Flood risk (surface, groundwater, fluvial and snow/ice melt) on the road network and damage to drainage systems with the potential for increased runoff from adjacent land contributing to surface water flooding.

With regard to climate change risks to the Proposed Development during the operational period, Volume III, Appendix 13.1 summarises potential changes in climatic parameters from 2020 onwards. Effects are considered to be negligible and not significant following mitigation.

13.5.6 Assessment of Cumulative Effects

Cumulative projects have been considered with regard to the air quality assessment. All cumulative projects considered for the project are detailed in Chapter 1 Table 1.1.

As stated by IEMA (IEMA, 2017), all GHG emissions are considered significant and therefore will contribute to climate change. However, the predicted GHG emissions of cumulative schemes, as listed in Chapter 1 – Introduction of this ES are not known. Furthermore, the cumulative GHG emissions would not just be limited to the cumulative schemes listed, as the receptor of the GHG emissions assessment is the global climate, with the UK National Carbon Budget used as a proxy. Consequentially, whilst any GHG emissions across the UK could be considered to have cumulative effects with the GHG emissions of the Proposed Development, the assessment methodology has by default already covered this wider perspective.

The cumulative impact of carbon emissions arising from global human activity is “High”. This is true to the nature of climate change as a global, cumulative problem. As committed developments have been assessed throughout this ES and particularly through the cumulative vehicular transport scenarios, the potential inter-scheme cumulative effects during the operational phase of the Development have already been considered.

It is assumed that all committed developments will be required to meet relevant standards for emissions reduction and to comply with related planning policy. On this basis, it is considered appropriate to assume that any applications that are consented include ‘reasonable’ measures to avoid, reduce and /or offset the generation of greenhouse gas emissions and therefore that no significant cumulative effects are anticipated.

The Applicant for the proposed Curraghinalt mine, currently under consideration by Department for Infrastructure (DfI) under planning application LA10/2017/1249/F, has committed to deliver the mine as a carbon neutral project and that due to this, there is no potential for or need to assess cumulative emissions from the mine and this Proposed Development cumulatively.

13.5.7 Inter-relationships

There are areas of potential inter-related effects between climate change and other ES topic areas. The first is flood risk, where future climate changes may increase the probability or intensity of high-rainfall events or increase coastal flooding risk. Flood risk including climate change allowances has been assessed in Chapter 10 Flood Risk of the ES. Secondly, there could be potential for climate changes to affect the potential for impact, on the future baseline circumstances, the sensitivity or vulnerability of receptors or the mitigation recommendations for other ES topics.

13.5.8 Transboundary

Climate change is a globally occurring phenomenon with impacts on the global climate related largely to atmospheric carbon dioxide levels and other greenhouse gas levels and emissions. An Imperceptible negative impact on transboundary climate will arise during the construction of the Proposed Development with the level of

impact being reduced by the implementation of the mitigation measures outlined in the ES. The significance of the transboundary impact of the Proposed Development located in Northern Ireland to GHGs in the Republic of Ireland is considered to be negligible and not significant.

13.6 Mitigation

13.6.1 Construction Phase Mitigation Measures

As with any construction site, there are associated vehicle movement, emissions and reuse of materials. With respect to vehicle emissions and materials, the following can help in reducing the GHGs emission to the atmosphere such that impacts will be negligible and not significant:

- All vehicles switch off engines when stationary and not in immediate use - no idling vehicles (emissions to air controlled);
- All plant utilised will be regularly inspected (emissions to air controlled) ;
- Visual monitoring of plant by operatives to ensure no black smoke is emitted other than during ignition (emissions to air controlled); and
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturers limits (emissions to air controlled); and
- The reuse of soil materials won from excavations;

These measures will be implemented throughout by the appointed contractor.

13.6.2 Climate Change Resilience

With the design and mitigation measures proposed, the Development is considered to be resilient to projected climate change. The resilience of the Development to climate change impacts is qualitatively assessed, based on professional expertise and judgement,

13.6.3 Operation

No significant adverse effect on the development due to climate change during operation is predicted. No mitigation measures are therefore suggested.

13.6.4 Future Monitoring

As no significant effects have been identified for the climate assessment, no monitoring of significant effects is proposed.

13.7 Summary of Effects

13.7.1 Construction and Operational

Construction and operation of the Development is likely to result in emissions of GHGs from direct sources and indirect sources. It is not anticipated that the scale of projected climate change identified will fundamentally alter baseline conditions or the effects included in this ES.

13.7.2 Decommissioning

No significant effect on or due to climate change during decommissioning is predicted. The decommissioning phase is not considered due to the long design life of the assets and given that emissions with the end of the life of this type of asset are relatively small and therefore unlikely to be significant.

13.7.3 Summary

Table 13.8 Summary of Likely Environmental Effects on Climate

Receptor	Sensitivity of receptor	Description of Effect	Duration	Magnitude	Significance	Significant / Not significant
Construction phase						
Construction Workers	High	Increased temperatures, prolonged periods of hot weather - Warm and dry conditions exacerbate dust generation and dispersions, health risks to construction workers.	Short term	Low	Negligible	Not Significant
Atmosphere	High	Emissions of Greenhouse Gases (GHGs)	Short term	Low	Negligible	Not Significant
Operational phase						
Atmosphere	High	Emissions of Greenhouse Gases (GHGs)	Long term	Low	Negligible	Not Significant

No significant effect on or due to climate change during **decommissioning** is predicted.

13.8 Limitations

By its very nature, climate change is associated with a range of assumptions and limitations. To overcome these issues, leading climate change data and science has been incorporated into the assessment and proven effective approaches undertaken for similar project types have been replicated. Changes in energy consumption impacts and the use of resources in the production, transportation, and final supply and use of energy are very complex. Future energy market modelling is complex and beyond the scope of this assessment.

13.9 References

DMRB Environmental & Sustainability - LA 114 – Climate, Highways Agency (HA), 2019.

Northern Ireland Greenhouse Gas Statistical Bulletin – September 2020 (DAERA, 2020)

Institute of Environmental Management and Assessment (IEMA), Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance, 2017.

Institute of Environmental Management and Assessment (IEMA), Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation, June 2020.

UK Climate Projections (UKCP) Website, Met Office, 2018.