15 Climate

In this chapter the potential significant effects of A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement scheme on climate, resulting from estimated changes in emissions of Greenhouse Gases (GHG), are assessed in accordance with Design Manual for Roads and Bridges (DMRB) LA 114 guidance and the Scotland National Application Annex.

The proposed scheme is expected to result in an increase in GHG emissions during the construction phase due to the consumption of materials, fuel and energy and the treatment and transportation of waste. Construction and maintenance related GHG emissions were therefore estimated using Transport Scotland's Projects Carbon Tool and available design information.

The significance of the proposed scheme's potential impacts on climate was assessed using professional judgement and based on the perceived likelihood of the proposed scheme affecting the UK or Scottish Government's ability to meet their respective carbon emissions reduction targets. Based on a comparison of the estimated change in GHG emission as a result of the proposed scheme with the relevant UK carbon budgets and Scottish carbon reduction targets, no significant effect is assessed in relation to climate and as such additional mitigation beyond what is embedded in the proposed scheme design is not required. Despite this conclusion, however, a number of measures are proposed in order to further minimise the change in GHG emissions as a result of the proposed scheme.

15.1 Introduction

15.1.1 This chapter reports the assessment of potentially significant environmental effects of the A985 Kincardine Bridge Refurbishment: Piled Viaduct Replacement (hereafter referred to as the 'proposed scheme') upon climate. A detailed description of the proposed scheme is presented in Chapter 3 (The Proposed Scheme).

15.1.2 The assessment has been produced with reference to DMRB Volume 11, Section 3, Part 14, LA 114 Climate (Highways Agency, Scottish Government, Welsh Assembly Government and the Department for Regional Development Northern Ireland 2019) (hereafter referred to as DMRB LA 114) guidance, which indicates that a climate assessment should consider both:

- the potential effects of the proposed scheme on climate, in particular the magnitude of and opportunities to reduce GHG emissions during the construction and operation of the proposed scheme; and
- the vulnerability of the proposed scheme to climate change, in particular whether anticipated changing climate conditions and weather events are likely to have significant adverse effects on the project (or elements of the project) during construction and operation.

15.2 Legislation, Policies and Guidance

15.2.1 The key legislative, policy, plans and statutory guidance influencing the design, construction and assessment of the proposed scheme with regard to the climate are identified in this section.

<u>International Level</u>

15.2.2 The Intergovernmental Panel on Climate Change (IPCC) (2014) AR5 Synthesis report states in the Summary for Policy Makers 2 that: "*Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems. Limiting climate change would require substantial and sustained reductions in greenhouse gas emissions which, together with adaptation, can limit climate change risks*".

15.2.3 In 1997, the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted to provide legally binding limits on carbon emissions for 37 countries, which includes the United Kingdom (UK). The Protocol committed to the reduction of carbon emissions by at least 18% below the 1990 levels during the second commitment period between 2013 and 2020.

15.2.4 In December 2015, the Paris Agreement, a global climate agreement, was adopted. The Paris Agreement was ratified and entered into force in November 2016. The central aim of the Paris Agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. The UK was one of the 160 countries that signed the agreement. The UK's response to meeting its commitments under the Paris Agreement resulted in the Climate Change Act 2008 (2050 Target Amendment) Order 2019, which set a 'net zero' carbon emissions target by 2050 (as detailed below).

National Level

15.2.5 Through the Climate Change Act 2008, as amended by the "2050 Target Amendment" in June 2019, the UK Government has committed to:

- reduce emissions by at least 100% of 1990 levels (net zero) by 2050;
- contribute to global emission reductions, to limit global temperature rise to as little as possible above 2°C.

15.2.6 To meet these targets, the UK Government has set five-yearly carbon budgets, which currently run until 2032. They restrict the amount of greenhouse gas the UK can legally emit in a five-year period. The carbon budgets are outlined in paragraph 15.3.18.

15.2.7 The Climate Change (Scotland) Act 2009, established a framework for Scotland to achieve its long-term goals of reducing carbon emissions by at least 80% by 2050. An interim target of a 42% reduction by 2020 was also set. The original 2050 goal was amended through the Climate Change (Emissions Reduction Targets) (Scotland) Bill that was passed in September 2019, which set a 'net-zero emissions target' for all carbon emissions by 2045. The interim targets where amended to become 56% by 2020, 75% by 2030, and 90% by 2040.

15.2.8 In the context of the Climate Change (Scotland) Act 2009, Scottish Ministers are obliged to lay a report in Parliament setting out their proposals and policies for meeting annual emissions reduction targets. This Climate Change Plan (CCP) is the Scottish Government's third report on proposals and policies for meeting its climate change targets for the period 2018–2032.

15.2.9 The second Scottish Climate Change Adaptation Programme 2019-2024 sets out policies and proposals to prepare Scotland for the challenges it will face from the impacts of climate change in the coming decades. The programme is a requirement of the Climate Change Act and addresses the risks presented in the UK Climate Change Risk Assessment 2017 (Scottish Government 2019).

15.2.10 The National Planning Framework 3 (NPF3) identifies a vision for Scotland that is *'…a low carbon place. We have seized the opportunities arising from our ambition to be a world leader in low carbon energy generation, both onshore and offshore. Our built environment is more energy efficient and produces less waste and we have largely decarbonised our travel …'*. It should be noted that NPF4 is expected to be published in 2021, which will provide a spatial planning response to the Global climate emergency up to 2050. As per the NPF4 Early Engagement – Policies (2020) publication, the proposed key objective of NPF4 is to ensure planning policy results in spatial and land use change that facilitates Scotland's ambition to have 'net-zero' emissions by 2045 and meet other statutory emissions reduction targets, whilst also supporting communities and businesses in making the changes needed to meet the targets. One of the main issues to be considered is the policy criteria needed to ensure that new developments,

including transport and infrastructure, contribute as far as possible to meeting emission reduction targets.

15.2.11 The Scottish Planning Policy (SPP) states that:

> *'NPF3 will facilitate the transition to a low carbon economy, particularly by supporting diversification of the energy sector. The spatial strategy as a whole, aims to reduce greenhouse gas emissions and facilitate adaptation to climate change. … The Climate Change (Scotland) Act 2009 sets a target of reducing greenhouse gas emissions by at least 80% by 2050, with an interim target of reducing emissions by at least 42% by 2020. Annual greenhouse gas emission targets are set in secondary legislation. Section 44 of the Act places a duty on every public body to act:*
>
> - *In the way best calculated to contribute to the delivery of emissions targets in the Act;*
> - *In the way best calculated to help deliver the Scottish Government's climate change adaptation programme; and*
> - *In a way that it considers is most sustainable.*
>
> *The SPP sets out how this should be delivered on the ground. By seizing opportunities to encourage mitigation and adaptation measures, planning can support the transformational change required to meet emission reduction targets and influence climate change. Planning can also influence people's choices to reduce the environmental impacts of consumption and production particularly through energy efficiency and the reduction of waste.'*

15.2.12 Both NPF3 and SPP highlight the planning outcome "*A low carbon place – reducing our carbon emissions and adapting to climate change*".

15.2.13 In February 2020, The Scottish Government released its latest Environment Strategy. In the strategy it is stated that '*By 2045 By restoring nature and ending Scotland's contribution to climate change, our country is transformed for the better – helping to secure the wellbeing of our people and planet.*'

Local Level

15.2.14 Falkirk and Fife Councils, in accordance with the Climate Change (Scotland) Act 2009, have undertaken Climate Change commitments by signing the Scotland's Climate Change Declaration (SCCD) in 2007.

15.2.15 In becoming a signatory of the SCCD, Falkirk and Fife Councils have made a commitment to:

- cut greenhouse gas emissions;
- set timescales and targets for action; and
- publish an Annual Progress Report (APR).

15.2.16 Falkirk Council published their first Carbon Management Plan (CMP) in 2007 to cover the period from 2007 - 2010. The most recent plan is the CMP 2015 – 2021, published in 2015, which explains how Falkirk Council will reduce its carbon emissions by at least 2.5% per year between 2015 to 2021 in order to align with the Scottish Government's carbon reduction target of 42% by 2020 (over a 1990/1995 baseline).

15.2.17 Fife Council published its Climate Action Plan in 2020, which sets out how it will work with its partners and communities between 2020-2030. It has three key aims: to become carbon neural; help communities and the economy minimise the impacts from climate change; and ensure all residents and the environment can benefit from the transition (Fife Council 2020).

Client Level

15.2.18 The Road Asset Management Plan for Scottish Trunk Roads (Transport Scotland 2016) identifies Environmental Sustainability as one of Transport Scotland's main objectives and specifically states "…*To protect the environment by minimising carbon emissions and promote the use of sustainable materials used on road maintenance work*".

15.2.19 Transport Scotland annually publishes the Carbon Account for Transport which provides a balance sheet for Scotland's GHG emissions associated with transport. The most recently published version is the Carbon Account for Transport No. 11: 2019, which is further explained in paragraph 15.4.3.

15.2.20 The Public Bodies Climate Change Duties guidance assists public bodies in compliance with the requirements of Part 4 of the Climate Change Act. It requires that public bodies must act in the best way possible to contribute to the delivery of emissions reduction targets and help delivery statutory requirements in a sustainable manner (Scottish Government 2011).

15.3 Approach and Methods

Scope and Guidance

15.3.1 This assessment addresses 'Climate' in accordance with DMRB Volume 11, Section 2, Part 1, LA 101 'Introduction to environmental assessment' (Highways Agency, Scottish Government, Welsh Assembly Government and the Department for Regional Development Northern Ireland 2019) (hereafter referred to as LA 101) which identifies 'Climate' as an EIA factor to be assessed.

15.3.2 Specifically, this assessment has been prepared in accordance with the DMRB LA 114 'Climate' (Highways Agency *et al*. 2019), supplemented by the Scotland National Application Annex (NAA) to DMRB LA 114 Climate[1] (in draft). These documents 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 GHGs from construction, operation and maintenance of motorway and all-purpose trunk road projects.

15.3.3 As detailed Chapter 3 (The Proposed Scheme) and Chapter 7 (Road Drainage and the Water Environment), an appropriate 35% allowance for climate change in line with the latest SEPA guidance has been incorporated into the drainage design of the piled viaduct replacement structure. The current drainage system for Kincardine Bridge discharges directly into the Forth Estuary with no treatment or attenuation. The new drainage associated with the proposed scheme will discharge to the existing SuDS basin at the Higgins Neuk Roundabout, prior to discharging to the Forth Estuary. The new drainage system has been designed to accommodate the 20% AEP (5-year) return period rainfall event, including the 35% allowance for climate change in line with the latest SEPA guidance (SEPA 2019b). Accordingly, the project is considered to have adequately accounted for the scheme's vulnerability to climate change and no further assessment of vulnerability is included in this chapter. As such, this chapter focuses solely on GHG emissions associated with the proposed scheme.

15.3.4 The potential GHG emissions sources scoped in/out of this assessment are summarised in Table 15.1, for each stage of the proposed scheme. DMRB LA 114 advises that a proportionate approach should be applied to capture the principal contributing factors associated with GHG emissions. On this basis, GHG emissions were not estimated for a number of sources, the justification for which is as follows:

- detailed information regarding on-site construction activities, fuel usage and electricity consumption is not possible to determine at the time of the assessment as the appointed contractor will be responsible for construction methods and was therefore not considered further;

[1] Transport Scotland has provided the draft Scotland NAA for DMRB LA 114 to inform this assessment. It is anticipated that the NAA will be published shortly in Revision 1 of DMRB LA 114.

- it is anticipated that the proposed scheme would not result in a substantial change in traffic flow, speed or composition of vehicles on the bridge during operation and therefore, changes in operational road user GHG emissions are considered unlikely and are therefore not considered further;
- traffic management during the construction of the proposed scheme has the potential to result in minor changes in the distribution of road traffic on the local road network for the duration of the works. Whilst simple assessments of the potential impact of such changes have been undertaken within Chapter 11 (Air Quality) and Chapter 12 (Noise), changes in GHG emissions as a result of traffic impacts during construction have not been considered within this assessment, as LA 114 only requires operational road user GHG emissions to be assessed. Furthermore, the magnitude of any changes in road user GHG emissions during the construction phase (which will occur over a relatively short time period) are likely to be negligible and LA 114 advises that a proportionate approach should be applied to capture only the principal contributing factors associated with GHG emissions associated with a project;
- in DMRB LA 114 (Section 3.12) it is stated that, '*a proportionate approach shall be applied to calculating and reporting GHG emissions from changes in land use and forestry (i.e. reporting only where there is likely to be a substantial change*)'. For the proposed scheme, the land use change both for the construction and operation phase is considered negligible as the existing piled viaduct structure is being replaced with minimal change to permanent footprint, and therefore this is not assessed further;
- the third life cycle stage, i.e. opportunities for GHG emissions reduction, is incorporated into the construction and operation stages as embedded mitigation and therefore is not considered separately. It should be noted that, DMRB LA 104 'Environmental assessment and monitoring' (DMRB Volume 11, Section 2, Part 4, LA 104 'Environmental Assessment and Monitoring' (Highways Agency, Scottish Government, Welsh Assembly Government and the Department for Regional Development Northern Ireland 2019) (hereafter referred to as LA 104) requires that the significance of an effect shall be reported including embedded mitigation measures; and
- GHG emissions from the decommissioning of the scheme at the end of its life are not considered, in accordance with DMRB LA 114, which specifically excludes any such emissions due to the length of the operational phase of the proposed scheme (paragraph 2.3).

15.3.5 In addition to DMRB LA 114, the following sources of information were utilised to inform the assessment:

- Transport Scotland Project Carbon Tool, a component of the Carbon Management System;
- Scottish Government climate change legislation and policy; and
- British Standards Institution (2016) PAS 2080:2016: Carbon management in Infrastructure.

Table 15.1: Carbon Emission Sources Included in the Assessment

Main Stage of Project Life Cycle	Sub-stage of Life Cycle	Potential Carbon Emissions Source	Scoped In/Out	Activity Data
Construction	Product stage; including raw material supply and manufacture	Embodied GHG emissions associated with the required raw materials for the main works of the proposed scheme: • construction of a temporary bridge adjacent to the existing structure; • construction of a temporary raised working platform; • replacement of the existing piled viaduct with a new five span structure of similar	✓	A breakdown of materials and specs was provided by the design team for the proposed scheme: • bulk material • aggregates • concrete; • steelwork;

Main Stage of Project Life Cycle	Sub-stage of Life Cycle	Potential Carbon Emissions Source	Scoped In/Out	Activity Data
		appearance to the adjacent spans of the Kincardine Bridge.		• drainage; • fencing; • road pavement; • paint; • safety barrier; • waste generated during phases; and • distance from waste treatment facilities / landfills used.
	Waste stage; including waste transport from site and treatment	Waste management during demolition and construction: • transportation of waste to management facilities; and • treatment of waste at appropriate facilities and landfill	✓	
	Construction process stage; including transport to/from works site and construction /installation processes.	Fuel or energy consumption by construction plants, materials delivery HDVs and other onsite construction activities.	X	N/A
	Land use change	GHG emissions mobilised from vegetation or soil loss during construction.	X	N/A
Operation	Use of the infrastructure by the operational road users	Vehicles using highways infrastructure.	X	N/A
	Operation and maintenance (including repair, replacement and refurbishment).	The proposed scheme is anticipated to be resurfaced every 10 years.	✓	Material design life
	Land use and forestry	Ongoing land use GHG emissions/ sequestration each year.	X	N/A
Opportunities for reduction	Carbon emissions potential of recovery including reuse and recycling carbon emissions potential of benefits and loads of additional functions associated with the study system	Avoided GHG emissions through substitution of virgin raw materials with those from recovered sources.	X	N/A

Study Area

15.3.6 In accordance with DMRB LA 114 Climate (paragraphs 3.8 to 3.9), a study area is required to be defined for the climate assessment. The study area for the proposed scheme is defined as follows:

- GHG emissions resulting from the construction process and the operational maintenance. As stated above, the study area is limited to GHG emissions associated with the materials' embodied carbon, transport of material from point of manufacture to site and waste management.

Managing GHG Emissions

15.3.7 The effective assessment and management of GHG emissions for highway schemes offers the opportunity to reduce the impact of projects on climate by minimising the magnitude of GHG emissions. As per LA 114, this assessment has been informed by the general principles of PAS 2080:2016 'Carbon Management in Infrastructure' (with the exception of setting project level carbon reduction targets), specifically:

- Relevance - Data and assessment methods relevant to the defined boundary of carbon management and assessment have been selected, documented and used;

- Completeness - All life cycle carbon emissions arising within the defined infrastructure system boundary which provide a material contribution to the management and assessment of carbon emissions have been included;
- Consistency - Consistent methodologies and data sources for carbon management and assessment have been and will be used to allow comparisons of emissions over time. Any changes to methodologies, assumptions or data sources will be transparently documented;
- Accuracy - The quantification of carbon emissions has neither over nor under estimated actual emissions, as far as can be judged, and uncertainties have been reduced as far as reasonably practicable. A sufficient level of accuracy has been achieved to enable users to make decisions with reasonable assurance as to the integrity of the reported information.
- Transparency - Information has been made available on the methodology and data sources used and any relevant assumptions to allow third parties to make associated decisions with confidence.

Baseline Conditions

15.3.8 The baseline data utilised in this chapter was obtained from publicly available sources. No direct consultation was required with the Overseeing Organisation (i.e. Transport Scotland) or relevant local authorities.

Impact Assessment

15.3.9 Specific human or natural receptors are not considered in the climate assessment as the receptor being considered is global climate. Human and natural receptors are considered in other assessments in this EIA Report e.g. Chapter 8 (Marine Ecology), Chapter 9 (Terrestrial Ecology), Chapter 11 (Air Quality) and Chapter 14 (Human Health). Therefore, the exact location of GHG emissions does not alter the potential effect.

15.3.10 The assessment of the effect of the proposed scheme on climate relies on a comparison of project related GHG emissions against UK Government or Overseeing Organisation carbon budgets. In this context, DMRB LA 114 indicates that significant effects should only be reported where increases in GHG emissions will have a material impact on the ability of Government to meet its carbon reduction targets.

15.3.11 Project related GHG emissions have been compared to UK Government carbon budgets and Scottish Government interim carbon reduction targets within this assessment.

15.3.12 In accordance with DMRB LA 114, GHG emissions are reported in metric tonnes of carbon dioxide equivalent (tCO_2e) for the assumed 120-year life span of the piled viaduct replacement structure. The assessment and reporting identify the scale and nature of carbon emissions across the whole project life cycle, taking into account the design and mitigation measures incorporated into the proposed scheme.

15.3.13 Mitigation embedded into the proposed scheme design is detailed in Section 15.5 (Potential Impacts) and essential mitigation is provided in Section 15.6 (Mitigation).

Significance Criteria

15.3.14 The significance criteria utilised in this chapter for the assessment of GHG emissions resulting from the proposed scheme are in accordance with DMRB LA 114 (paragraphs 3.18 to 3.21) and the Scotland NAA (Section S/2).

15.3.15 The following carbon metrics (expressed as tCO_2e) were calculated for the construction and operation phase and compared separately and in total against the relevant UK Government carbon budgets and the Scottish Government interim carbon reductions targets:

- Estimated total carbon over carbon budget in Do-Something scenario; and

- Net proposed project carbon emissions (i.e. difference between Do-Something and Do-Minimum scenarios).

15.3.16 The UK Government carbon budgets considered in this chapter are:

- 3rd carbon budget: 2018-2022 - 2,544 $MtCO_2e$;
- 4th carbon budget: 2023-2027 - 1,950 $MtCO_2e$; and
- 5th carbon budget; 2028-2032 - 1,725 $MtCO_2e$.

15.3.17 A carbon budget covering the period after 2032 and up to the proposed scheme's design year has not yet been set, however, the UK Government is committed under the Climate Change Act (2050 Target Amendment) Order 2019, to achieving net-zero emissions by 2050 and the Scottish Government to achieving 'net-zero' emissions by 2045 under the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019.

15.3.18 As there are no published carbon budgets specific to Scotland, the proposed scheme's carbon emissions are additionally compared against the Scottish Government interim carbon emissions reduction targets (i.e. 2030 and 2040). For example, the reduction target for 2030 is 75% of the 1990 carbon emissions; therefore, the proposed scheme's emissions in year 2030 are compared with the 25% of the 1990 emissions.

15.3.19 The significance of effect of the proposed scheme's emissions on the ability of the UK and/or Scottish Governments to meet their respective carbon emissions targets was assessed using professional judgement, based on a comparison of the aforementioned metrics.

15.3.20 It should be noted that, as stated in DMRB LA 114, it is very unlikely that the impact of a road project would, in isolation, affect the ability of Government to meet its carbon reduction targets.

15.3.21 To benchmark the performance of a scheme, DMRB LA 114 (paragraph 3.21) states that GHG emissions should be compared to other highway projects (with GHG emissions normalised to take account of differences in size and scale). However, during this assessment no appropriate benchmarks were identified, nor were available from the Overseeing Authority, to allow for a meaningful comparison and therefore no comparison was undertaken.

Assessment Methodology

Construction Stage

The Transport Scotland Projects Carbon Tool

15.3.22 Transport Scotland has developed and implemented a Carbon Management System (CMS) as a suite of tools to measure Scope 1, 2 and 3 carbon emissions associated with their construction and maintenance activities across their road and rail schemes. As shown on Diagram 15.1, Scope 1 includes direct emissions from combustion of fuel on site, Scope 2 includes indirect emissions from the consumption of purchased electricity and Scope 3 includes indirect emissions such embodied emissions from the manufacture of materials.

15.3.23 The CMS fulfils two roles:

- it enables consistent transport and objective measurement and reporting of carbon emissions from Transport Scotland's construction and maintenance operations and schemes; and
- it supports design and construction optioneering.

15.3.24 The 2016 version of Transport Scotland's Projects Carbon Tool is part of the CMS suite of tools. The tool is used to estimate carbon emissions associated with civil and structural engineering projects, including road, rail and buildings.

15.3.25 Whole life carbon options can be estimated for projects based on the embodied carbon associated with the materials used, the transport of materials and waste, site plant energy consumption, any operational energy and emissions associated with structural maintenance.

15.3.26 For this assessment, only emissions embodied within the materials used, the emissions from transportation of materials to site from point of manufacture and those associated with cyclic maintenance have been reported based on the information currently available.

Information Used in Carbon Tool

15.3.27 Entries into the tool are based on the proposed scheme design and information available at the time of the assessment. It is noted that elements of the proposed scheme may continue to be refined throughout the design process resulting in potential changes in material quantities.

15.3.28 The design information and waste information that was incorporated into this carbon assessment is presented in Tables 15.5 and 15.6, and includes:

- information on earthworks required for the proposed scheme;
- detailed pavement specifications for the proposed scheme;
- road markings;
- civil engineering aspects including steel and concrete;
- piling elements;
- drainage pipe and filter material;
- kerbs;
- safety barriers; and
- information on waste treatment and transport.

15.3.29 The initial step towards carbon management is to identify and map out the emissions sources that can be attributed to a project through its life cycle; management and reduction can only occur after this. Whilst the proposed scheme would aim to identify and account for as much carbon as possible, it is a more efficient approach to prioritise some sources over others, rather than calculating the absolute footprint of the project, as many components will have a negligible impact and offer limited opportunities for mitigation compared to the time, effort and cost involved in determining its carbon impact.

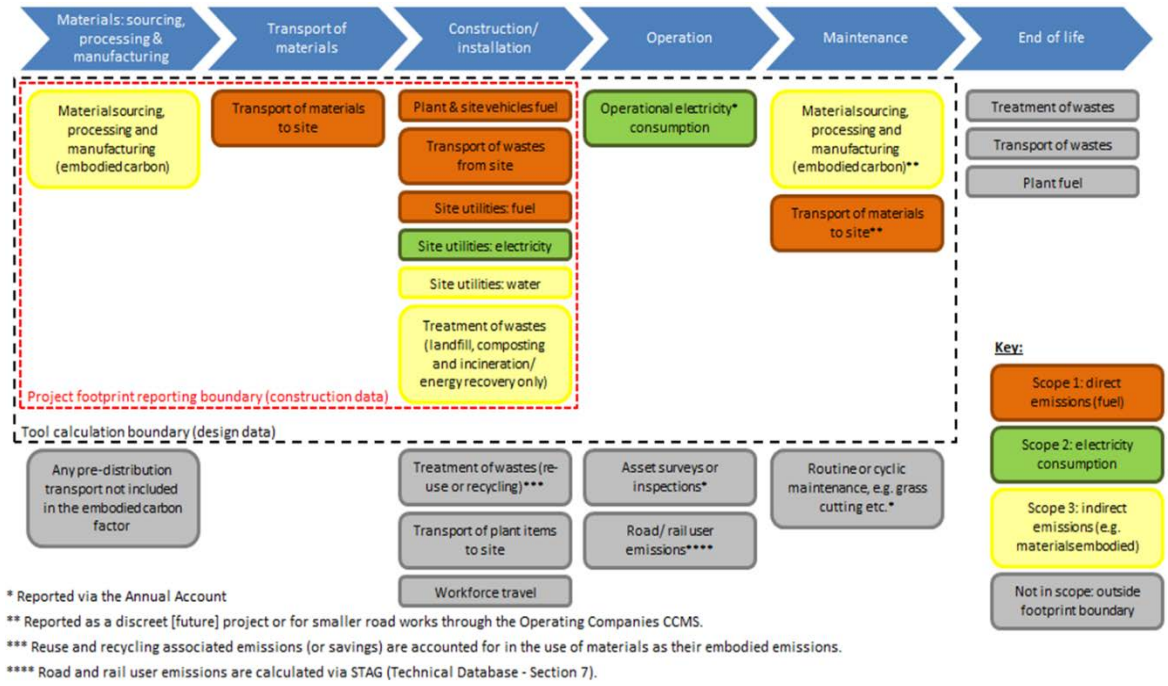

Diagram 15.1: Transport Scotland Project Carbon Tool Boundary (Transport Scotland 2016)

Maintenance and Operational Needs

15.3.30 For the appraisal of GHG emissions from maintenance activities and operational needs, only the embodied emissions of materials are considered, following a proportionate approach in accordance with DMRB LA 114 (paragraph 3.14), as other GHG emissions related with maintenance works and electricity consumption are not expected to be sizeable. For the embodied emissions, an indicative replacement frequency of materials was provided based on their design life, and the GHG emissions from cyclic maintenance activities calculated.

Limitations of the Assessment

15.3.31 The construction GHG emissions appraisal was constrained, to an extent, due to the limited data available. Specifically, there was incomplete or unknown information relating to the following:

- plant and site vehicle fuel usage;
- site utilities: fuel usage; electricity and water; and
- operational electricity consumption.

15.3.32 the most recent iteration of the Transport Scotland Projects Carbon Tool is the 2016 version, which uses material conversion factors that have since been superseded following the release of new factors in the Inventory of Carbon Emissions (ICE) database in 2019. Additionally, the electricity grid emission factors in the 2016 version of the tool are now four years out of date and in that time, the carbon intensity of electricity has decreased.

15.3.33 GHG emissions from staff commuting to/from the construction site have not been considered at this stage, as this level of detail will only be available during construction. Therefore, it is assumed that the Contractor, following the preparation of their TMP and CEMP, will report the emitted CO_{2e} throughout the course of construction using the TS Carbon Tool and the Department for Environment, Food and Rural Affairs (Defra)'s Emissions Factor Toolkit from (EFT) (Defra 2019).

15.3.34 The limitations set out above are common for this type of assessment. For instance, the usage of construction plant on site and consumption of utilities is determined by Contractor's site operations.

15.3.35 Due to the nature of the proposed scheme (i.e. bridge refurbishment) it is anticipated that the proposed scheme would not result in a substantial long-term change in traffic flows, speed or composition of vehicles on the local road network and therefore changes in operational road user GHG emissions are considered likely to be negligible. Changes in road traffic GHG emissions as a result of traffic management measures implemented during the construction phase (which will occur over a relatively short time period) are also considered likely to be negligible.

15.4 Baseline Conditions

Existing GHG Emissions

15.4.1 The proposed scheme is located within the administrative boundaries of Falkirk Council. Falkirk council-wide carbon dioxide equivalent (CO_2e) emissions, obtained from the most recent UK National Atmospheric Emissions Inventory (NAEI) dataset for local authorities (BEIS 2019), are presented in Table 15.2 and are compared with relevant emission totals for Scotland as a whole.

15.4.2 The total net council-wide CO_2e emissions are 2,386 kt (kiloton), which account for approximately 8.3% of the total net emissions in Scotland. Road transport related CO_2e emissions in Falkirk Council (i.e. 389 kt) account for 16.3% of total council emissions and 3.6% of total road transport related CO_2e emissions in Scotland.

Table 15.2: Estimated CO_{2e} Emissions (kt) from Activities Within Falkirk Council 2017 (BEIS 2019)

Falkirk Council CO_2 emissions (kt CO_2e)			
Emission Source	**kt CO_2e**	**Emission Source**	**kt CO_2e**
Industry and Commercial Electricity	106	Domestic 'Other Fuels'	20
Industry and Commercial Gas	140	Road Transport (A roads)	99
Large Industrial Installations	1,408	Road Transport (Motorways)	166
Industrial and Commercial Other Fuels	40	Road Transport (Minor roads)	123
Agriculture	9	Diesel Railways	13
Domestic Electricity	69	Transport Other	2
Domestic Gas	173	LULUCF Net Emissions	19
Total net council-wide emissions			**2,386**
A-roads % of total net Falkirk Council CO_2e emissions	4.1%	Road transport % of total net Falkirk Council CO_2e emissions	16.3%
Falkirk % of Scottish Total net CO_2e emissions	8.3%	Falkirk Council % of Scottish Road Transport CO_2e emissions	3.6%

15.4.3 As identified in Transport Scotland's Carbon Account for Transport No. 11 (2019), road transport emissions in 2017 are estimated to have accounted for 68.5% of Scotland's total transport emissions and 25.2% of total emissions in Scotland. It should be noted that whilst total carbon emissions in Scotland are estimated to have reduced by 3.3% between 2016 and 2017 (and by 46.2% below the 1990 baseline), road traffic emissions are estimated to have increased in recent years (e.g. 9.3% increase from 2011-2017), increasing their relative contribution. These divergent trends are due to the fact that (a) increases in vehicle kilometres travelled have outweighed improvements in vehicle efficiency over this period and (b) emissions associated with electricity consumption have reduced substantially due to the continued switch away from coal towards gas and renewable energy.

Proposed Scheme Baseline

15.4.4 The baseline against which the proposed scheme has been compared to is the Do-Minimum scenario. In a Do-minimum Scenario, the typical GHG emission sources include maintenance works (e.g. materials embodied emissions), operational electricity use (i.e. lighting) and operational road users (i.e. vehicles' fuel consumption) for the existing road network. However, as it has not been possible to calculate GHG emissions for any of these sources within this assessment, GHG emissions associated with the proposed scheme have been compared to a baseline of zero, which is worst-case.

15.5 Potential Impacts

Embedded Mitigation

15.5.1 LA 114 states that projects should seek to minimise GHG emissions in all cases to contribute to the UK's target for a net reduction in carbon emissions. Reporting and guidance, such as the Infrastructure Carbon Review (UK Government 2013) and PAS 2080:2016 (BSI 2016) indicate that the potential to influence carbon emissions decreases as a project progresses. The largest savings can be achieved during the planning stage, with more modest reductions achievable during design and construction.

15.5.2 Taking this into consideration, the key early intervention procedure, as identified in the Infrastructure Carbon Review (HM Treasury 2013) can be considered to be:

- avoid and/or eliminate or 'build nothing': challenge the need; explore alternative approaches to achieve the desired outcome;
- reduce or 'build less': maximise the use of existing assets, optimise asset operation and management to reduce the extent of new construction required;
- substitute, replace or 'build clever': design in the use of low carbon materials, streamline the delivery process, minimise resource consumption; and
- compensate or 'build efficiently': embrace new construction technologies, eliminate waste.

15.5.3 Carbon quantification is necessary to understand the carbon impacts of a project and enable opportunities for carbon savings to be identified. A number of mitigation measures have, however, been 'embedded' within the scheme design, which will have reduced the magnitude of GHG emissions associated with the proposed scheme, compared to what would otherwise have been the case. The magnitudes of these reductions in GHG emissions have, however, not been quantified as part of this assessment.

<u>Construction and Maintenance</u>

15.5.4 A number of measures are proposed within Chapter 13 (Material Assets and Waste) to minimise the consumption of material assets and the generation of waste over the lifecycle of the proposed scheme's assets, which will reduce GHG emissions associated with the proposed scheme.

15.5.5 Beyond this, the planning and design specification should aim to reduce or avoid where practicable, the use of carbon intensive materials, (e.g. steel), or processes (e.g. significant earthwork excavations). Where this is not possible, material volumes or processes should be substituted with lower intensity replacements if achievable within the bounds of the design standards for safety and quality.

15.5.6 Where it would not significantly impact upon engineering, safety and maintenance characteristics, the principle of substitution requires that low carbon alternatives for materials should be considered. As reported in Chapter 13 (Material Assets and Waste) the following opportunities for reducing material consumption have been incorporated into the design:

- Designed for materials optimisation: Piled viaduct replacement structure designed using latest analysis software to drive design efficiency and reduce the quantity of all materials used in the

construction. The concrete mix for the structural members has been specified as containing 40% ground-granulated blast-furnace slag (GGBS) addition. This addition of recycled material is more sustainable than Portland cement (CEM1) and will reduce peak temperatures during curing (hydration) which reduces the effect of Early Thermal Cracking, and hence reduces the volume of steel reinforcement required (larger bars or closer spacings); and

- Designed for the future: Piled viaduct replacement structure made integral to remove the need for bearings and movement joints. This reduces the maintenance liability and need to replace components over the lifetime of the structure. Use of stainless steel reinforcement in critical areas to improve durability of structure and minimise future maintenance interventions.

15.5.7 It is assumed that the structural steel, kerbs and safety barrier used for the temporary bridge structure is being rented from a hiring company, therefore reducing the need for new manufacture and increasing the circularity of the material.

Construction

15.5.8 The GHG emissions sources considered for the construction phase of the proposed scheme include the materials' embodied carbon from its manufacture, the transport of the material from its point of manufacture to the construction site and the emissions from transport and treatment of waste. Transport Scotland's CMS Tool was used to estimate the carbon emissions associated with the proposed scheme as explained in Section 15.3 (Approach and Methods). The results are presented in Tables 15.3 and 15.4. A conservative approach was adopted in the calculations based on professional judgement, including a 10% contingency to cover unknown items. The transportation distance for materials from point of manufacture to the construction site has been estimated based on guidance within Transport Scotland's CMS Tool and from Chapter 13 (Material Assets and Waste) based on local and regional facilities.

15.5.9 In Table 15.3 total GHG emissions from the construction phase are summarised per construction element. The structures element is expected to make the highest contribution to total construction emissions; 11,421 tCO_2e relative to total embodied emissions of 13,403 tCO_2e. Emissions from transport of material to site totals 796 tCO_2e.

15.5.10 The material quantities considered for the construction assessment is presented in Table 15.5. The contribution of each material type to the total construction emissions is summarised in Table 15.4, considering again a conservative approach and including a 10% contingency to cover unknown items. The materials expected to be the most impactful to the total construction GHG emissions are structural steel and concrete, accounting for the 8,151 tCO_2e and 3,291 tCO_2e, respectively.

15.5.11 Emissions from waste treatment and transportation is presented in Table 15.6 based on information obtained from Chapter 13 (Material Assets and Waste). Waste arisings have been estimated through a number of methods, including reference to estimated quantities; and the application of material specific wastage rates, at good practice levels provided in the WRAP (2008) 'Net Waste Tool Dataset', to the estimated material quantities reported for the proposed scheme.

15.5.12 Indicative waste recovery rates have been sourced from the Scotland's Environment Waste Discover Data tool (SEPA n.d.), which provides a breakdown of the quantity of each waste stream recycled or recovered or disposed of in 2017 from all sources in Scotland, whilst the indicative waste recovery rate for the excavated landfill materials was sourced from the SEPA (2019) 'Waste from all sources: waste data tables 2017' recycling rate for special (hazardous) soils.

15.5.13 Transportation distances for waste materials have been determined using professional judgement based on the several waste management facilities within the vicinity of the proposed scheme. A transportation distance of 20km has been applied to encompass appropriate facilities in the local authority area.

15.5.14 The information presented in Table 15.6 apply a conservative approach and include a 10% contingency. Waste treatment and transport emissions account for 497 tCO_2e.

15.5.15 The overall GHG emissions during the construction phase, including both the embodied emissions, transport of materials and the emissions associated with the treatment of wastes, equates to 14,696 tCO_2e. It should be noted that due to rounding of data outputs, there are slight discrepancies between the totals presented in Tables 15.4 to 15.6 when compared to Table 15.3. It is confirmed that the information provided in theses tables is correct as an output of the Carbon Tool.

Table 15.3: Summary of Embodied Carbon for Project Elements

Project Elements	Embodied Carbon (tCO_2e)	Transport of Materials (tCO_2e)
Drainage	29	0
Earthworks	1,837	686
Road Pavement	104	16
Safety Barriers	12	0
Structures	11,421	94
Total	**13,403**	**796**

Table 15.4: Summary of Embodied Carbon by Material Types

Material Types	Embodied Carbon (tCO_2e)
Aggregate	5
Asphalt and bitumen	96
Concrete, cement, and cement substitutes (including steel reinforcement)	3,291
Iron and steel	8,151
Paint and coating	1
Plastic	198
Soil	1,661

Table 15.5: Design Information Incorporated into the GHG Assessment

Project Phase	Material Type	Unit	Quantity	Transport Distance (km)
Construction – Raised working platform	Earthworks import – Class 1A/B material (Series 600)	m^3	47,410	40
	Drainage pipes	m	2180	40
	Drainage manholes	no.	20	40
	Drainage headwall reinforced concrete	m^3	10	15
	Geotextiles	t	20	40
Construction – temporary bridge structure	Structural steel (embodied carbon not assessed as assumed use of a temporary structure comprising pre-fabricated components that would be returned to a hiring company but return transport has)	t	2,990	30
	Reinforced pre-cast concrete (incl. 300kg rebar per m^3 of concrete)	m^3	5,470	15
	Reinforced concrete piles	m^3	1,240	15
	Timber formwork	t	70	15

Project Phase	Material Type	Unit	Quantity	Transport Distance (km)
	Kerbs (embodied carbon not assessed as assumed use of a temporary structure comprising pre-fabricated components that would be returned to a hiring company but return transport has)	m	530	80
	Road pavement sub-base course	m^3	200	40
	Road pavement base course	m^2	1,550	40
	Road pavement binder course	m^2	1,550	40
	Road pavement surface course	m^2	1,550	40
	Bituminous tack coat (Base-binder)	m^2	1,550	40
	Bituminous tack coat ((Binder-surface)	m^2	1,550	40
	Safety barrier (embodied carbon not assessed as assumed use of a temporary structure comprising pre-fabricated components that would be returned to a hiring company but return transport has)	m	230	80
	Road markings	m	800	40
Construction – new permanent bridge structure and approaches	Structural steel	t	4,080	15
	Parapet steel panels	t	50	15
	Reinforced in-situ concrete (incl. 300kg rebar per m^3 of concrete)	m^3	1,270	15
	Reinforced concrete piles (incl. 300kg rebar per m^3 of concrete)	m^3	420	15
	Timber formwork	t	200	15
	Kerbs	m	180	40
	Base course	m^2	740	40
	Binder course	m^2	740	40
	Surface course	m^2	740	40
	Safety barriers	m	180	40
	Road markings	m	270	40

Table 15.6: Waste Information Incorporated in the GHG Assessment and tCO_2e from Waste Treatment and Transport

Material type	Recycle / Landfill	Quantity	Unit	Transport Distance (km)	Waste Treatment Emissions (tCo_2e)	Waste Transport Emissions (tCo_2e)
Construction – Temporary bridge structure and approaches						
Timber	Recycle	130	t	20	0	0.6
Demolition – Existing bridge structure and approaches						
Steel	Recycle	760	t	20	0	3.8
Steel parapets	Recycle	50	t	20	0	0.2
Concrete	Landfill	860	t	20	1.7	4.3
Piles	Landfill	70	t	20	0.1	0.3
Reinforcement	Recycle	190	t	20	0	0.9
Kerbs	Recycle	230	t	20	0	1.1
Asphalt	Recycle	90	t	20	0	0.4

Material type	Recycle / Landfill	Quantity	Unit	Transport Distance (km)	Waste Treatment Emissions (tCo_2e)	Waste Transport Emissions (tCo_2e)
Construction – New permanent bridge structure and approaches						
Timber	Recycle	200	t	20	0	1.0
Demolition – Temporary bridge structure and approaches						
Steel	Reuse	2,990	t	20	0	14.8
Concrete	Landfill	12,040	t	20	24.1	59.6
Concrete Reinforcement	Recycle	380	t	20	0	1.9
Piles	Landfill	2,730	t	20	5.5	13.5
Concrete Pile Reinforcement	Recycle	380	t	20	0	1.9
Kerbs	Reuse	660	t	20	0	3.3
Asphalt	Recycle	680	t	20	0	3.4
Demolition – Raised working platform						
Class 1A/B Material	Recycle	69,220	t	20	0	342.8
Geotextile	Recycle	20	t	20	0	0.3
Plastic drainage pipe	Reuse	8	t	20	0	0
Drainage manholes concrete	Landfill	16	t	20	0.1	0
Drainage manhole iron	Reuse	3	t	20	0	0
Headwall concrete	Landfill	22	t	20	0	0.1
Earthworks removal						
Waste material bored from pile location	Recycle	2,090	t	20	0	10.3
Totals					**32**	**465**

Operation

15.5.16 The GHG sources considered for the operation phase are emissions associated with the maintenance of the proposed scheme (i.e. emissions associated with the consumption of materials – embodied carbon).

15.5.17 For the maintenance/refurbishment related carbon emissions, it was assumed that the following indicative replacement frequencies for materials would be applied according to design life:

- carriageway surface course – 10 years;
- road markings – 10 years;
- carriageway binder course – 20 years;
- carriageway base course – 40 years;
- carriageway tack coat (base/binder) – 20 years;
- carriageway tack coat (binder/surface) – 10 years;
- safety barriers – 25 years; and

- footway kerbs – 20 years.

15.5.18 In Table 15.7 the total GHG emissions from the maintenance phase during the whole life cycle of the proposed scheme are summarised per construction element. Road pavement is the construction element with the highest contribution to the total maintenance emissions; 154 tCO_2e, accounting for 76% of the maintenance emissions.

Table 15.7: Summary of Total Maintenance Emissions of the Scheme

Project Element	Maintenance Phase: Materials Embodied (tCO_2e)
Road Pavement	154
Safety Barriers	48
Total emissions	**202**

15.5.19 The net change in GHG emissions between the Do-Something and the Do-Minimum scenario, both from the construction and operation phase, is summarised in Table 15.8. A comparison of the net GHG emissions against the relevant UK Government carbon budgets and Scottish Government interim carbon reduction targets (i.e. 2030 and 2040) is summarised in Table 15.8 and Table 15.9, respectively.

15.5.20 From Table 15.8, it is can be seen that the vast majority of the net change in GHG emissions resulting from the proposed scheme originate from the construction phase (14,697 tCO_2e) accounting for 98.6%. It is anticipated that construction would not commence before summer 2021 (subject to completion of statutory procedures) and the overall construction period is expected to be between 18 to 24 months. The impact of the scheme on the 3rd carbon budget (2018-2022) and the 4th carbon budgets (2023-2027) is attributed solely to the construction phase, whilst the 5th carbon budget (2028-2032) is impacted solely by the operation stage. However, the change in GHG emissions expected to result from the proposed scheme, relative to each carbon budget is estimated to be negligible, accounting for less than 0.001% of the 3rd, 4th and 5th carbon budgets.

15.5.21 The net change in GHG emissions for the years that Scottish Government interim carbon reduction targets have been defined for, i.e. 2030 and 2040, is 0 tCO_2e and 202 tCO_2e, respectively. These are estimated to account for the <0.001% of the corresponding targets, which is considered negligible.

Table 15.8 Net Change in GHG Emissions (Do-Something - Do-Minimum) Compared with Relevant UK Carbon Budgets

Project Stage	Net Change in GHG Emissions (tCO_2e)	Net Change in GHG Emissions distributed per Carbon Budget (tCO_2e)			Change as Percentage of Relevant Carbon Budget (%)		
		3rd	4th	5th	3rd	4th	5th
Construction and waste management	14,697	11,022	3,674	0	<0.001	<0.001	<0.001
Operation	202	0	0	202	<0.001	<0.001	<0.001
Total	14,899	11,022	3,674	202	<0.001	<0.001	<0.001

Table 15.9 Net Change in GHG emissions (Do-Something - Do-Minimum) Compared with Scottish Interim Targets

Project Stage	Net Change in GHG Emissions in Interim Target Year (tCO_2e)		Net Change in GHG Emissions as Percentage of Scottish Interim Target (%)	
	2030	2040	2030	2040
Operation*	0	202	0	<0.001
*Only operation emissions are presented for comparison as construction activities will have been completed prior to 2030				

15.6 Mitigation

15.6.1 Essential mitigation for impacts on climate is described below.

Construction

15.6.2 Maximising the amount of local labour would also reduce GHG emissions from construction workers travelling to and from the site. Also, the production of a TMP by the Contractor (**Mitigation Item CC1**) would facilitate further GHG emission avoidance by optimising employees commute (e.g. car sharing, public transport).

15.6.3 The Contractor should produce a Construction Environmental Management Plan (CEMP) which should incorporate energy efficiency and carbon reduction measures to construction activities on site where practicable (**Mitigation Item CC2**).

15.6.4 Quarterly emissions monitoring would be required by the contractor to report emissions from construction activities on site which is not possible at the time of assessment as stated in paragraph 15.3.29 (**Mitigation Item CC3**).

Operation

15.6.5 The embodied emissions from the materials needed for the maintenance of the proposed scheme during its whole life cycle comprise approximately 1.8% of total embodied emissions (i.e. accumulated embodied emissions from construction and maintenance). A large part of the maintenance embodied emissions originates from road pavement resurfacing, including the surface course, sub-base and base course. Investigation of either a more hard-wearing material for the road surface course or a material with lower embodied emissions (e.g. recycled plastic) should be considered in order to either reduce the maintenance frequency, or the total emissions per maintenance phase, respectively. This process should be undertaken before the commencement of any large maintenance works to encompass any future technological developments in the pavements and materials domain.

Schedule of Environmental Commitments

15.6.6 A summary of the essential mitigation measures, to be implemented in the construction of the proposed scheme, is provided in Table 15.10. Chapter 17 (Schedule of Environmental Commitments) contains the complete schedule of measures for the proposed scheme.

Table 15.10: Schedule of Environmental Commitments – Climate

Mitigation Item	Responsible Party for implementation	Timing of Measure	Description	Mitigation Purpose/ Objective	Specific Consultation or Approval Required	Monitoring/Compliance
CC1: Travel Management Plan (TMP)	Contractor	Pre-construction - before the initiation of works and when the required data are available.	The Contractor will prepare a TMP to capture the proposed travelling of staff required for the construction of the proposed scheme and measures to optimize journeys and demonstrate how the TMP has contributed to reduced carbon emissions.	GHG emissions reduction.	Yes / Transport Scotland	Quarterly carbon emissions report during the construction prepared by the Contractor to be required via inclusion in Employer's Requirements.
CC2: Construction Environmental Management Plan (CEMP)	Contractor	Pre-construction and during construction	As part of the CEMP, the Contractor should incorporate energy efficiency and carbon reduction measures on site where practicable.	GHG emission monitoring	Yes / Transport Scotland	Quarterly carbon emissions report during the construction prepared by the Contractor to be required via inclusion in Employer's Requirements.
CC3: Quarterly Carbon Emissions Reporting	Contractor	Construction Phase	Estimate and report carbon emissions on a quarterly basis during Construction Phase using the CMS Carbon Tool	GHG emission monitoring	Yes / Transport Scotland	Quarterly carbon emissions report during the construction prepared by the Contractor to be required via inclusion in Employer's Requirements.

15.6.7 The information provided accounts for emissions associated with the proposed scheme design, as it is currently known. There is opportunity for the appointed Contractor to further develop and refine aspects, such as temporary construction works, construction methods and traffic management, and ongoing consideration should be discussed with Transport Scotland where construction methods may contribute to a reduction or increase in emissions.

Monitoring

15.6.8 Quarterly carbon emissions reporting during the construction phase will be required by the constructor of the scheme in accordance with the Overseeing Organisation's requirements (i.e. DMRB LA 114 and the Scottish NAA) using the CMS Carbon Tool. This measure will facilitate the process of reviewing the performance of the proposed scheme against the carbon estimations in the EIA Report and supplementing them utilising data which are available only during the construction phase. The requirement to undertake monitoring shall be included in the CEMP in order to secure the application of the requirement during the construction phase.

15.6.9 In the quarterly carbon emissions reports the Contractor will need to include the emissions from staff commuting to/from the construction site.

15.6.10 Quarterly carbon emissions reporting during the operation phase will be required in accordance with the Overseeing Organisation's requirements (i.e. DMRB LA 114 and the Scottish NAA) using the CMS Carbon Tool. The reports will include actual materials and fuel/energy consumption data and will facilitate the process of reviewing the performance of the proposed scheme against the carbon estimates in the EIA Report.

15.7 Residual Effects

15.7.1 In accordance with DMRB LA 114, and based on professional judgement, the GHG emissions both for the construction and operation stage of the proposed scheme is likely to have an adverse impact. However, the magnitude of the additional carbon emissions is predicted to be negligible when compared with the UK Government carbon budgets and the Scottish Government interim carbon reduction targets. Therefore, it is not expected that the proposed scheme will materially hinder the Scottish or UK Governments from meeting their legislative carbon reduction targets. As such no significant residual effects are identified in this assessment.

15.7.2 It is noted, however, that the Committee on Climate Change (CCC) will publish its recommendation on the level of the Sixth Carbon Budget in December 2020. The Sixth Carbon Budget, required under the Climate Change Act, will provide ministers with advice on the volume of greenhouse gases the UK can emit during the period 2033-2037. Most importantly, it will set the path towards the UK's 2050 net-zero emissions target, as the first carbon budget to be set into law following that commitment. As such, the Sixth carbon Budget will be substantially lower than the Third, Fourth and Fifth UK carbon budgets, against which the estimated increase in GHG emissions as a result of the proposed scheme have been compared within this assessment.

15.7.3 However, whilst the estimated change in GHG emissions as a result of the proposed scheme will be larger in relative terms compared to the forthcoming Sixth Carbon Budget than to the Fifth Carbon Budget, for example, the estimated change in GHG emissions as a result of the proposed scheme within the Sixth Carbon Budget period will still be extremely small (e.g. < 0.001%) relative to this budget. As such, it is not expected that the impact of the proposed scheme will materially hinder the UK Government from meeting the Sixth Carbon Budget. It is acknowledged, however, that no formal guidance is provided within LA 114 on what relative increase in GHG emissions as a result of a proposed scheme could be considered to result in a 'material impact'.

15.8 Assessment of Policy Compliance

15.8.1 DMRB Volume 11 Section 2, Part 4, LA 104 states that environmental assessment, reporting and monitoring shall meet the requirements of the national planning policy for each relevant Overseeing Organisation.

15.8.2 Appendix A4.1 (Assessment of Policy Compliance) provides a review of national and local policy documents which are of relevance to the assessment undertaken and reported in this chapter in accordance with DMRB guidance.

15.8.3 National planning policy objectives (and accompanying best practice guidance) of relevance to this assessment are provided in the National Planning Framework 3 (2014), Scottish Planning Policy (SPP) (Scottish Government 2014) themes *Sustainability* and *Promoting Active Travel*. Other policy of relevance includes Scotland's National Marine Plan (SNMP) Policy GEN 5 (Climate Change) (Scottish Government 2015) and Falkirk Local Development Plan 2 Policies PE01 (Placemaking) and PE26 (Air Quality) (Falkirk Council 2020). The Environmental Strategy for Scotland (Scottish Government 2020), Climate Change Plan – The Third Report on Proposals and Policies 2018-2032 (Scottish Government 2018-2032 and Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2023 (Scottish Government 2018), are also of relevance to assessing the proposed scheme's compliance with relevant policy.

Summary of Policy Compliance

15.8.4 Overall, the design and assessment of the proposed scheme has had regard to policy objectives to minimise effects on climate change. It is assessed that the proposed scheme does not conflict with national legislation and policy. A full policy compliance assessment can be found in Table 10 of Appendix A4.1 (Assessment of Policy Compliance).

15.9 Statement of Significance

15.9.1 As the results of this assessment suggest increases in GHG emissions as a result of the proposed scheme are unlikely to have a material impact on the ability of the UK or Scottish Governments to meet their respective carbon reduction targets, the significance of effect of the proposed scheme on climate is considered not significant.

15.10 References

Reports and Documents

British Standards Institution (2016), PAS 2080: Carbon Management in Infrastructure. Available at: https://shop.bsigroup.com/ProductDetail?pid=000000000030323493

Department for Environment Food and Rural Affairs (2019), Emissions Factor Toolkit version 9. Available at: https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html

Department for Business, Energy & Industrial Strategy (2019), UK local authority and regional carbon dioxide emissions national statistics. Available at: https://www.gov.uk/government/collections/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics

Falkirk Council (2015). Carbon Management Plan. Available at: https://www.falkirk.gov.uk/services/environment/environmental-policy/climate-change/docs/climate-change-legislation/Carbon%20Management%20Plan%202015%20-%202021.pdf?v=201906271131

Falkirk Council (2020). Falkirk Local Development Plan 2.

Fife Council (2020). Climate Fife: Sustainable Energy and Climate Action Plan (2020-2030)

Intergovernmental Panel on Climate Change (2014), AR5 Synthesis Report – Summary for Policymakers. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf

Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure Northern Ireland (2019). Design Manual for Roads and Bridges, LA 104 Environmental assessment and monitoring, Revision 1.

Highways England, Transport Scotland, Welsh Government, and Department for Infrastructure Norther Ireland (2019). Design Manual for Roads and Bridges, LA 114 Climate.

HM Treasury (2013), Infrastructure Carbon Review.

Jacobs (2019). A985 Kincardine Bridge Refurbishment Piled Viaduct Replacement Scoping Report.

The Scottish Government (2007), Scotland's Climate Change Declaration.

The Scottish Government (2011). Public Bodies Climate Change Duties: Putting them into Practice.

The Scottish Government (2014), Scottish Planning Policy.

The Scottish Government (2014), National Planning Framework 3.

The Scottish Government (2015), Scotland's National Marine Plan (SNMP) GEN 5 (Climate Change)

Scottish Government (2019). Climate Ready Scotland: Second Scottish Climate Change Adaptation Programme 2019-2024.

The Scottish Government (2020), Climate Change Plan: third report on proposals and policies 2018-2032 (RPP3).

The Scottish Government (2020), Environment Strategy.

SEPA (n.d.), Scotland's Environment Waste Discover Data tool (Last updated: March 2019): [https://www.environment.gov.scot/data/data-analysis/waste-from-all-sources/].

SEPA (2019), Waste from all sources: waste data tables: [https://www.sepa.org.uk/media/413268/2017_waste_data_tables.xlsx].

SEPA (2019b). Climate change allowances for flood risk assessment in land use planning (LUPS-CC1). Available at: https://www.sepa.org.uk/media/426913/lups_cc1.pdf.

Transport Scotland (2016), Road Asset Management Plan: https://www.transport.gov.scot/media/32978/j408891.pdf

Transport Scotland (2016) Transport Scotland Projects Carbon Management Tool.

Transport Scotland (2016). Transport Scotland CMS Project Carbon Boundary.

Transport Scotland (2016). Carbon Management Plan 3rd Edition.

Transport Scotland (2019), Scotland National Application Annex to LA 114 Climate (Revision 1), Available at: In publication

UK Government (2013), Infrastructure Carbon Review.

United Nations Framework Convention on Climate Change (1997), Kyoto Protocol.

United Nations Framework Convention on Climate Change (2016), Paris Agreement.

WRAP (2008), Net Waste Tool Dataset: [http://nwtool.wrap.org.uk/Documents/WRAP%20NW%20Tool%20Data%20Report.pdf].

EU Directives and National Legislation

Scottish Government (2009), The Climate Change (Scotland) Act 2009.

Scottish Government (2019). Climate Change (Emissions Reduction Targets) (Scotland) Bill.

UK Government (2019), Climate Change Act 2008.