Volume 1, Chapter 9

Carbon and greenhouse gases
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9. CARBON AND GREENHOUSE GASES

9.1 Introduction

Introduction

9.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the assessment of the likely significant effects of the DCO Project with respect to carbon¹ and greenhouse gas (GHG) emissions. This includes emissions from construction, air transport, surface access transport, and airport buildings and ground operations. Hereafter, all emissions will be referred to as GHG emissions unless stated otherwise². This chapter should be read in conjunction with the DCO Project description provided in Chapter 6: DCO Project description and with respect to relevant parts of the following chapters:

1. Chapter 7: Air quality and odour – has a similar assessment scope to the carbon and other GHGs chapter, where similar assumptions have informed both assessments with regard to construction site activities, surface access transport, the landing and take-off (LTO) of aircraft and use of Auxiliary Power Units (APUs)

2. Chapter 10: Climate change – presents the in-combination effects of the DCO Project and climate change on environmental receptors. It also addresses the vulnerability of the DCO Project itself to climate change and the actions required to build resilience

3. Chapter 20: Waste – assessment modelling has informed both the construction and operational phases of the GHG emissions assessment. The GHG emissions assessment reflects waste generation rates and disposal strategies presented within this chapter

4. Appendix 20.1: Draft Resource Management Plan, Volume 3 – presents the DCO Project’s water demand and supply which has been used in the GHG emissions assessment. The draft resource management plan (RMP) also describes the DCO Project’s energy supply requirements, as well as how it will strive to meet the level of ambition contained within Heathrow 2.0 goals, which includes several GHG emissions related commitments under Goal 10.1

¹ ‘Carbon’ is used here as shorthand for carbon dioxide and other GHG emissions, as is common in Government policy documents.

² There are places in this chapter where it is necessary to differentiate between carbon dioxide and GHGs. For example, Air Transport does not assess GHGs other than carbon dioxide.
Chapter 9: Carbon and greenhouse gases

5. Chapter 23: Bibliography

6. Glossary of terms and list of abbreviations.

7. Preliminary Transport Information Report (PTIR), Volume 1 – has been used to inform the surface access GHG emissions assessment. The GHG emissions assessment has utilised the traffic and transport modelling outputs, including transport modes and volumes of traffic modelled

8. Draft Code of Construction Practice (CoCP) – describes environmental measures affecting GHG emissions from construction

9. Surface Access Proposals (SAP), Part 2 – includes details of environmental measures affecting GHG emissions from surface access.

9.1.2 This chapter describes:

1. The planning policy, legislation and other relevant documentation that has informed the assessment (Section 9.2: Relevant legislation, policy, and other important relevant matters)

2. The outcome of consultation and external engagement that has been undertaken, including how matters on GHG emissions within the Scoping Opinion received in July 2018 have been addressed (Section 9.3: Scoping and engagement)

3. The scope of the assessment for GHG emissions (Section 9.4: Scope of the assessment)

4. The assumptions and limitations of the PEIR assessment (Section 9.5: Assumptions and limitations of this PEIR)

5. The current baseline and methods used for the baseline data gathering (Section 9.6: Current baseline)

6. The assessment methods used for quantifying the GHG emissions footprint for the Environmental Impact Assessment (EIA) (Section 9.7: GHG emissions quantification methodology for PEIR)

7. The future baseline scenario (Section 9.8: Future baseline)

8. Environmental measures relevant to GHG emissions (Section 9.9: Embedded environmental measures)

9. The results of the GHG emissions footprint assessment (Section 9.10: Quantification of GHG emissions)

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11. The assessment of significance (Section 9.12: Preliminary assessment of significance)

12. The United Kingdom (UK) carbon reduction targets and budgets for comparison with the DCO Project emissions (Section 9.13: Methodology for assessing impact on UK Government carbon reduction targets and carbon budgets)

13. The assessment of alignment with UK carbon reduction targets (Section 9.14: Preliminary assessment of effect on Government carbon reduction targets and carbon budgets)

14. Consideration of the assessment of cumulative effects (Section 9.15: Assessment of cumulative effects)

15. Consideration of additional environmental measures and further GHG reduction strategies, which have not been included in the assessment but are relevant for understanding the wider context (Section 9.16: Consideration of additional environmental measures or compensation).

16. A summary of the next steps in the DCO application process (Section 9.17: Next steps).

9.1.3 In-combination effects are considered in Chapter 22: In-combination effects.

9.1.4 This chapter describes three scenarios, in response to an Airports National Policy Statement (ANPS) requirement. Section 9.9 describes the environmental measures that are included in each of these scenarios:

1. **Future baseline**: Heathrow continues to be capped at 480,000 Air Transport Movements (ATMs) with two runways

2. **DCO Project without mitigation**: three runway scenario, without environmental measures other than those which are part of the physical infrastructure of the preferred masterplan

3. **DCO Project with mitigation**: three runway scenario, including the full suite of environmental measures.

9.1.5 ‘Environmental measures’ is the preferred terminology which has been adopted throughout this PEIR, rather than mitigation. However, the term mitigation has been used in this chapter to demonstrate how Heathrow specifically responds to the ANPS requirement to ‘quantify the greenhouse gas impacts before and after mitigation to show the impact of the proposed mitigation’. The scenario labels should not be interpreted as literal descriptions of each scenario, for example, the DCO Project ‘without mitigation’ scenario includes a range of environmental measures that are an inherent part of the preferred masterplan design. Therefore,
the DCO Project ‘without mitigation’ scenario should not be interpreted as excluding environmental measures.

9.1.6 GHG emissions have been modelled for the period 2022 to 2050 for the future baseline and DCO Project without mitigation scenarios.

9.1.7 GHG emissions for the DCO Project with mitigation scenario have only been modelled for surface access. This is because the environmental measures in the Surface Access Proposals (SAP) are at a more advanced stage of development than other environmental measures. GHG emissions for the DCO Project with mitigation scenario will be quantified in the ES. More details are provided in Section 9.9.

9.1.8 There are five appendices to this chapter:

1. Appendix 9.1: Carbon and greenhouse gases – Current baseline, Volume 3 describes the methodology and the results of the existing (2017) baseline assessment
3. Appendix 9.3: Carbon and greenhouse gases – Air transport, Volume 3
4. Appendix 9.4: Carbon and greenhouse gases – Surface access, Volume 3
5. Appendix 9.5: Carbon and greenhouse gases – Airport buildings and ground operations, Volume 3.

9.1.9 Appendices 9.2 to 9.5 provide detail on the preliminary GHG quantification for the four sub-aspects within the scope of this chapter (construction, air transport, surface access, and airport buildings and ground operations). The overall preliminary assessment is described in this chapter, along with a summary of the GHG quantification for each of the four sub-aspects.

9.2 Relevant legislation, policy and other important relevant matters

Introduction

9.2.1 This section identifies the policy, legislation and other relevant documentation that has informed the scope of the assessment presented in this chapter. Further information on policies relevant to the EIA and their status is provided in Chapter 2: Legislative and policy overview of this PEIR.

Legislation and national planning policy

9.2.2 Table 9.1 lists the legislation relevant to the assessment of the effects on GHG emissions.
### Table 9.1: Legislation relevant to GHG emissions assessment

<table>
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<tr>
<th>Legislation description</th>
<th>Relevance to assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Greenhouse Gas Emissions Trading Scheme Regulations 2012</strong></td>
<td>The DCO Project will have an effect on GHG emissions which would require management under the EU ETS of traded and non-traded GHG emissions.</td>
</tr>
<tr>
<td>The Greenhouse Gas Emissions Trading Scheme Regulations 2012 is the UK legislation implementing the European Union Emission Trading Scheme (EU ETS).</td>
<td>Appendix 9.3 of this PEIR presents results of the air transport assessment and shows the effect of the DCO Project on emissions subject to the EU ETS for aviation (known as traded emissions). Appendix 9.5 of this PEIR describes how the EU ETS policy on traded and non-traded GHG emissions is considered in relation to airport buildings and ground operations, which includes gas combustion.</td>
</tr>
<tr>
<td>The EU ETS is a policy tool for reducing GHG emissions based on a cap-and-trade mechanism whereby a total amount of allowable annual carbon emissions from electricity generation and large energy-intensive industries have been agreed at the EU level. The coverage of EU ETS was extended in 2012 to include aviation carbon emissions from flights to and from EU countries. Following legal challenge to its application to non-EU destinations, it has been temporarily amended to only include flights within EU countries.</td>
<td></td>
</tr>
<tr>
<td><strong>Climate Change Act (CCA) 2008</strong></td>
<td>The DCO Project will have an effect on GHG emissions which requires assessment in line with the CCA.</td>
</tr>
<tr>
<td>The CCA 2008 sets the basis for the UK’s approach to tackling climate change. The CCA sets a GHG emissions reduction target of 80% by 2050 compared to a 1990 baseline. The Committee on Climate Change (CCC) provides advice and establishes carbon budgets to achieve this target. Domestic aviation carbon dioxide (CO₂) emissions are included in the UK carbon budgets, while international aviation CO₂ emissions are at present excluded. This accords with advice from the CCC, who at present recommends that international aviation CO₂ emissions should be formally excluded from carbon budgets, whilst also providing headroom for international aviation to allow for inclusion at a later date. This means that international aviation CO₂ emissions are implicitly allowed for in carbon budgets that have been approved by Government (to date this extends to the fifth Carbon budget out to 2032). The CCC has also recommended that UK aviation CO₂ emissions, from both international and domestic</td>
<td>In the consultation document Aviation 2050: The future of UK aviation strategy (Aviation 2050 strategy), the Government has proposed to continue using the CCC advice and leave ‘headroom’ for international aviation when setting carbon budgets so that the economy as a whole is on a trajectory to meeting the 2050 CCA target (including international aviation). The implications of the recently published Net Zero Report by the CCC are detailed in Table 9.3. The Airports National Policy Statement (ANPS) and National Policy Statement for National Networks (NN NPS) both make statements in relation to the CCA and carbon reduction targets (described in Table 9.2). Section 9.13 presents the methodology and results for assessing the DCO Project alignment with the UK carbon budgets and climate change obligations with a sensitivity allowing for headroom for international aviation by 2050.</td>
</tr>
</tbody>
</table>
9.6.3 **Table 9.2** lists the national planning policy and international policy relevant to the GHG emissions assessment.

**Table 9.2: National and international planning policy relevant to GHG emissions**

<table>
<thead>
<tr>
<th>Policy description</th>
<th>Relevance to assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National policy</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Airports National Policy Statement (ANPS)</strong></td>
<td>The ANPS sets out requirements for the GHG emissions assessment in this PEIR. The methodology described in Section 9.7 and the scope of the GHG emissions assessment presented within Section 9.4 of this PEIR are aligned with the requirements of the ANPS. The requirements of the ANPS are addressed as follows: The GHG emissions assessment in Section 9.10 of this PEIR provides preliminary evidence of the carbon impact of the DCO Project both from construction and operation and assesses the impact against the Government’s carbon obligations. It quantifies the GHG effects in the DCO Project without mitigation scenario. It does not, at this stage, quantify the GHG effects of the DCO Project with mitigation scenario for the reasons explained in this chapter. It splits emissions into traded and non-traded sectors and distinguishes between international and domestic aviation emissions. This PEIR quantifies impacts including emissions from surface access due to airport and construction staff; emissions from surface access due to freight and retail operations and construction site traffic; emissions from surface access due to airport passengers and visitors; emissions from airport buildings and ground operations including energy and fuel use.</td>
</tr>
<tr>
<td><strong>Chapter 2</strong> provides an explanation of the relevance of the ANPS to the DCO Project in general terms. Paragraphs 5.69 to 5.83 of the ANPS are of relevance to the assessment presented in the chapter in relation to GHG emissions and are summarised below: Paragraphs 5.69 and 5.70 state the Government’s objective for the aviation sector to contribute to reducing global GHG emissions. Paragraphs 5.71 to 5.73 refer to the CCA 2008 carbon target for 2050, and how emissions from international aviation are taken into account by the CCC in setting the five-year UK carbon budgets. Paragraph 5.74 outlines the activities of the DCO Project with potential to increase GHG emissions: air transport, airport buildings and ground operations, surface access and construction. Paragraphs 5.76 and 5.77 set out scope, scenarios and years that should be covered as part of the EIA for the DCO Project. Paragraphs 5.78 states that: “The applicant is expected to take measures to limit the carbon impact of the project”.</td>
<td></td>
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3 This is referred to as a “planning assumption” by the CCC.
<table>
<thead>
<tr>
<th>Policy description</th>
<th>Relevance to assessment</th>
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<tr>
<td>and Paragraphs 5.78 to 5.80 set out examples of mitigation measures that could be adopted in the construction and operation of the DCO Project.</td>
<td>The GHG emissions assessment in Section 9.10 of this PEIR sets out GHG emissions for the key reporting years: opening year, peak operation and worst case.</td>
</tr>
<tr>
<td>Paragraph 5.82 is of particular relevance. It states: “Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets.”</td>
<td>The methodology described in Section 9.11 of this PEIR explains how significance of effect is determined and Section 9.14 addresses the ANPS requirement as to whether the DCO Project has a material impact on the Government’s ability to meet its carbon reduction targets including carbon budgets.</td>
</tr>
<tr>
<td>Paragraph 5.83 is also relevant. It states: “The Secretary of State’s view of the adequacy of the mitigation measures relating to design, construction and operational phases will be a material factor in the decision making process.”</td>
<td>Section 9.9 sets out the approach to environmental measures for the DCO Project, which will be developed further and quantified as part of the Environmental Statement (ES). The quantification will provide evidence of the adequacy of the environmental measures in reducing the carbon footprint of the DCO Project.</td>
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National Policy Statement for National Networks (NN NPS)

| Chapter 2 provides an explanation of the relevance of the NN NPS to the DCO Project in general terms. | The NN NPS sets out requirements for the GHG emissions assessment methodology as described in Section 9.7. |
| Paragraphs 5.16 to 5.19 of the NN NPS are of relevance to the assessment presented in this chapter and are summarized below: | Section 9.14 assesses the extent to which the DCO Project has a material impact on the Government’s ability to meet its carbon budgets, which will be updated as required in the subsequent ES and inform the Secretary of State’s view of the adequacy of the mitigation measures relating to design and construction. |
| Paragraph 5.16 states that the UK carbon budgets include development of new national road infrastructure in the trajectory to meet the CCA target for 2050. | Section 9.9 sets out the approach to environmental measures for the DCO Project, including the M25 works, which will be developed further and quantified as part of the ES. The quantification will provide evidence of the adequacy of the environmental measures in reducing the carbon footprint of the DCO Project. |
| Paragraph 5.17 explains that carbon impacts are taken into account at option appraisal stage and EIA for DCO application stage, and that applicants should provide evidence of carbon impacts and assess them against the carbon budgets. | |
| Paragraph 5.18 is of particular relevance. It explains how carbon increases from road development are included in the Government’s plan to meet the carbon budgets. It states: “any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the proposed scheme are so significant that it would have a material impact on the ability of Government to...” | |
### Policy description

**Meet its carbon reduction targets including carbon budgets.**

Paragraph 5.19 is also relevant. It states:

"Evidence of appropriate mitigation measures (incorporating engineering plans on configuration and layout, and use of materials) in both design and construction should be presented. The Secretary of State will consider the effectiveness of such mitigation measures in order to ensure that, in relation to design and construction, the carbon footprint is not unnecessarily high. The Secretary of State’s view of the adequacy of the mitigation measures relating to design and construction will be a material factor in the decision making process."

### National Planning Policy Framework (NPPF), Ministry of Housing, Communities and Local Government (MHCLG), 2019

**Chapter 2** provides an explanation of the relevance of the NPPF to the DCO Project in general terms.

Chapter 14 of the NPPF advises on and supports the transition to a low carbon future and provides guidance on planning for climate change mitigation and GHG emissions reduction.

Paragraph 151 in particular states:

"To help increase the use and supply of renewable and low carbon energy and heat, plans should:

a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development[...];
b) consider identifying suitable areas for renewable and low carbon energy sources[...]; and
c) identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."

### UK Aviation Policy Framework (APF), March 2013

The APF sets out the Government’s policy framework for the UK aviation sector. With respect to climate change the Government’s objective (paragraph 12) is to:

"ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions."

The APF reinforces other legislation and policy including the Climate Change Act 2008, which informs this assessment.

The climate change policies detailed in the APF are being reviewed by the Government through the Aviation 2050 strategy, as described in Table 9.3.
### Policy description

<table>
<thead>
<tr>
<th>Policy description</th>
<th>Relevance to assessment</th>
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</thead>
<tbody>
<tr>
<td>The Aviation 2050 strategy is going through consultation (closing 20th June 2019) and therefore does not presently represent adopted policy. Once the Aviation 2050 strategy is adopted it will be used to inform the assessment presented in the ES, as detailed in Chapter 2.</td>
<td></td>
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### International policy

#### United Nations Framework Convention on Climate Change (UNFCCC)

The UNFCCC was created in 1992 with the aim of tackling climate change through international negotiation and cooperation. In 2015 the Paris Agreement was adopted, with the aim to strengthen the global response to climate change by limiting global temperature increase this century to below 2 degrees Celsius above pre-industrial levels and pursue efforts to limit temperature increase even further to below 1.5 degrees Celsius. To achieve this aim, the Paris Agreement additionally sets a target for net zero global carbon emissions in the second half of this century (UNFCCC, 2015). The Paris Agreement came into force in November 2016.

Legislated carbon budgets are based on advice from the CCC and designed to meet the CCA 2008 target of an 80% reduction by 2050. The CCA 2008 target was set to ensure UK’s contribution to limiting global climate change to below 2 degrees Celsius. At the request of government the CCC have recently reviewed the UK’s CCA target in light of agreements made at Paris. The recommendations of this review, which are not adopted policy are described further in Table 9.3.

Section 9.13 sets out the methodology and the assessment for determining whether the DCO Project’s GHG emissions materially impact the UK’s ability to meet its carbon reduction targets, including legislated carbon budgets.

#### ICAO CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation)

In October 2016, the International Civil Aviation Organization (ICAO) announced the introduction of a global market-based emissions offsetting scheme known as CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation).

CORSIA aims to offset any growth in carbon emissions from international aviation after 2020 over three phases, a pilot phase from 2021 until 2023, the first phase from 2024 to 2026 and the second phase from 2027 to 2035. Growth in emissions above those in 2020 will be offset by airlines purchasing emission reduction credits, which they will then be required to submit to the government of the country in which the flight originated. The amount individual airlines will be required to offset up to 2029 will be based on a global average and from 2030 to 2035 based on a combination of the global average and an individual airline’s growth.

The assessment has considered the likely implications of participation in CORSIA by airlines which use Heathrow. This is discussed in Section 9.16.
Regional and local planning policy

9.2.4 Appendix 2.1: Regional and local planning policy and other important and relevant matters, Volume 3 presents the full list of the regional and local planning policies relevant to the assessment of carbon and GHG emissions.

9.2.5 The local planning policies from the following local authorities have been considered:

1. Greater London Authority
2. London Borough of Hillingdon
3. London Borough of Hounslow
4. South Bucks District Council
5. Slough Borough Council
6. Spelthorne Borough Council
7. Runnymede Borough Council
8. London Borough of Richmond upon Thames
9. London Borough of Ealing
10. Royal Borough of Kensington and Chelsea
11. Westminster City Council
12. Elmbridge Borough Council

Other important and relevant matters

9.2.6 Table 9.3 lists other documentation, which are not policy or legislation but are relevant to the assessment of the effects on GHG emissions.

Table 9.3: Other documentation relevant to GHG emissions

<table>
<thead>
<tr>
<th>Documentation description</th>
<th>Relevance to assessment</th>
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</thead>
<tbody>
<tr>
<td><em>Aviation 2050: The future of UK aviation</em></td>
<td>The Aviation 2050 strategy is going through consultation, and therefore does not represent adopted policy. Notwithstanding this, this preliminary assessment has considered the implications of the Government’s proposals. Section 9.13 describes the consideration of “headroom” in the 2050 target and Section 9.14</td>
</tr>
<tr>
<td>Policy proposals for the Aviation Strategy to 2050 and beyond were published by the Department for Transport (DfT) in December 2018.</td>
<td></td>
</tr>
<tr>
<td>Paragraph 3.87 is of particular relevance to this assessment:</td>
<td></td>
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</tbody>
</table>
### 3.87 The government agrees with the current CCC advice that international aviation emissions should, for now, continue to be formally excluded from carbon budgets. The government proposes therefore, to continue using the CCC advice and leave ‘headroom’ for international aviation when setting carbon budgets so that the economy as a whole is on a trajectory to meeting the 2050 Climate Change Act target (including international aviation). To set a clear level of ambition for the sector, the government proposes to: accept the CCC’s recommendation that emissions from UK-departing flights should be at or below 2005 levels in 2050.

Consider the CCC’s recommendation that emissions from UK-departing flights should be at or below 2005 levels in 2050.


In 2014, the IPCC published its Fifth Assessment Report (AR5): Synthesis Report, further reinforcing its statement that human influence on climate change is clear and growing. Climate change is the largest inter-related cumulative environmental effect which has the potential to lead to significant environmental effects on a wide range of areas (population, fauna, soil, temperature change, rising sea level, etc.). The IPCC’s AR5 highlights that the risks associated with climate change can be limited as long as global temperature increase is stabilised to below 2 degrees Celsius relative to pre-industrial levels.

A Sixth Assessment Report (AR6) will be produced in the first half of 2022. Three Special Reports and a Methodology Report will be produced ahead of finalising the AR6.

The IPCC’s AR5: Synthesis Report provides robust evidence that climate change poses a global risk and underpins the international response in terms of setting carbon budgets which are used to contextualise the DCO Project’s GHG emissions.

Chapter 10: Climate change addresses the vulnerability of the DCO Project to climate change, and the in-combination impacts of climate change and the DCO Project on environmental receptors.

### Intergovernmental Panel on Climate Change (IPCC) Special Report (SR15): Synthesis Report, 2018

In 2018, the IPCC released SR15 on the impacts of global warming of 1.5 degrees Celsius above pre-industrial levels and related GHG emission pathways. The purpose of this report is to strengthen the global response to the threat of climate change.

SR15 highlights a number of climate change impacts that could be avoided by limiting global warming to 1.5 degrees Celsius compared to 2 degrees Celsius.

Government formally requested that the CCC review the UK’s CCA 2008 and specifically whether the current national target (80% reduction by 2050 vs 1990) remains valid. The CCC published their report in May 2019 described further below.
## Committee on Climate Change, Net Zero. The UK’s contribution to stopping global warming, 2019 (CCC Net Zero Report)

The CCC Net Zero report responds to a request from the Governments of the UK, Scotland and Wales to provide updated advice on the UK’s long-term emissions targets, including the possibility of setting a new ‘net-zero’ target.

The report recommends that the UK should legislate as soon as possible to reach net-zero greenhouse gas emissions by 2050. It advises that this target can be legislated as a 100% reduction in greenhouse gases from 1990 and should cover all sectors of the economy, including international aviation and shipping.

The report advises that the aim should be to meet the target through UK domestic effort, without relying on international carbon units, though the CCC do not completely rule out international carbon units as a useful contingency.

Specifically, on the issue of aviation the CCC has assumed in its “core” scenario that emissions from UK aviation would be aligned with the Government’s proposed objective (as detailed in the Aviation 2050 strategy consultation) for emissions in 2050 to be at or below 2005 levels (37.5 MtCO₂). The report also identifies additional scenarios, including a Further Ambition scenario where 2050 emission levels are reduced to around 30MtCO₂ through the deployment of more ambitious technologies.

The report acknowledges aviation needs to strengthen both domestic and internationally agreed policies. The report also recognises the importance of CORSIA and highlights that it will need to be based on robust rules that deliver genuine emission reduction.

<table>
<thead>
<tr>
<th>Documentation description</th>
<th>Relevance to assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alongside this report the CCC are also due to publish a report in response to the Aviation 2050 strategy proposals in the second half of 2019.</td>
<td></td>
</tr>
<tr>
<td>Once the Aviation 2050 strategy is adopted it will be used to inform the assessment presented in the ES.</td>
<td></td>
</tr>
<tr>
<td>SR15 has therefore not directly impacted the methodology used in this assessment.</td>
<td></td>
</tr>
</tbody>
</table>

The CCC Net Zero report provides recommendations to the Government and is therefore not adopted UK policy. Consequently, there are no specific recommendations at this point in time on the levels of future carbon budgets nor proposed changes to approved carbon budgets. On the issue of aviation emissions, the report notes consistency with the Government’s proposed objective of limiting those emissions to 2005 levels by 2050.

The assessment presented in this PEIR does not explicitly seek to reflect recommendations from the CCC Net Zero report in terms of potential changes to current and future carbon budgets. **Section 9.14** examines the relationship between Heathrow’s future emissions and the proposed Government objective to keep UK aviation emissions to 2005 level by 2050.
9.2.7 A summary of other relevant documentation to the assessment of carbon and GHG emissions is provided within Appendix 2.1.

9.3 Scoping and engagement

Overview

9.3.1 This section describes the outcome of, and response to, the Scoping Opinion in relation to the GHG emissions assessment. It also provides details of the ongoing technical engagement that has been undertaken with stakeholders and individuals which is of relevance to the assessment presented in this PEIR.

9.3.2 Technical engagement has taken the form of meetings and is summarised in the following sections.

Scoping Opinion

9.3.3 A Scoping Report requesting a Scoping Opinion was submitted to the Secretary of State, administered by the Planning Inspectorate (PINS) on behalf of the Secretary of State, on 21 May 2018. The Heathrow EIA Scoping Report (May 2018) set out the proposed aspect assessment methodologies, outlined the baseline data collected to date and proposed for the ES, and set out the scope of the assessment.

9.3.4 A Scoping Opinion was adopted by PINS on 2 July 2018. Table 9.4 sets out the comments received in section 4 of the Scoping Opinion (‘Aspect based scoping tables’) for GHG emissions and how they have been addressed in the PEIR. The information provided in the PEIR is preliminary and therefore not all the Scoping Opinion comments could be addressed at this stage. All Scoping Opinion comments will be addressed in the ES.

Table 9.4: PINS Scoping Opinion consultation

<table>
<thead>
<tr>
<th>PINS ID number</th>
<th>Scoping Opinion comment</th>
<th>How is this addressed?</th>
</tr>
</thead>
<tbody>
<tr>
<td>46</td>
<td>The Inspectorate recommends that the ES assesses the impact on arriving flights to the extent that the new airspace design affects the arriving traffic consistent with the CAP1616a requirements.</td>
<td>Technical engagement with the Civil Aviation Authority has clarified that it is not necessary to report CO2 for arriving flights that are subject to airspace change in the PEIR. This information will instead be provided through documentation associated with the Airspace Change Process (ACP) which is subject to a separate consenting mechanism, in accordance with the requirements of CAP1616a.</td>
</tr>
</tbody>
</table>
## PINS ID number | Scoping Opinion comment | How is this addressed?
---|---|---
47 | Table 3.7 of the Heathrow EIA Scoping Report (May 2018) indicates that the identified airport supporting facilities are not relevant to this aspect (GHG emissions) of the ES, apart from energy generation plant. The Inspectorate advises that airport supporting facilities should not be scoped out of the GHG emission calculations for this aspect of the ES until it can be demonstrated that these facilities do not give rise to a significant effect, for instance in combination with other elements of the Proposed Development. | Airport supporting development are not scoped out and an approach that accounts for them in the GHG emissions assessment has been applied in Appendix 9.5. The final details of the airport supporting development have not been determined at this stage of design. In order to assess the potential effects of the airport supporting development, a reasonable worst case approach has been applied to the preliminary assessment to reflect the uncertainties surrounding the scale and nature (for instance, type and function of assets). For example, using value of investment made, or area of development planned, as proxies to determining embodied and operational GHG emissions. The assessment will be further refined between the PEIR and ES as the design develops. |
48 | The temporal scope of the assessment for the construction and operational phases for this aspect of the Proposed Development is anticipated to be 2022-2050. The ES should justify the choice of peak construction and operation years selected for the assessment of emissions scenarios. | Section 9.6 provides justification for the temporal scope of the assessment. Peak construction and operational years are defined, and a justification provided for each in Section 9.7 of this PEIR. The GHG emissions at peak construction and operational years are reported in Section 9.10 of this PEIR. |
49 | The Inspectorate recommends that loss of vegetation including trees and woodland should be included in the GHG emissions calculations used for assessment. The Forestry Commission’s response is highlighted in this respect. | The assessment of GHG emissions will include the effect of land use change (to be assessed in the ES), as shown in Table 9.5. The land use change quantification will capture GHG emissions associated with the following impacts:
1. Where existing ‘carbon sinks’, such as grassland or forested land, are lost to allow for the DCO Project, stored carbon will be released;
2. New green spaces, provided as part of landscaping and biodiversity measures, will act to sequester carbon. |
50 | The Heathrow EIA Scoping Report (May 2018) highlights anticipated decreases in GHG emissions from improvements in the aviation sector in aircraft engine fuel consumption efficiencies, the adoption of biofuels, or improved airspace design in future. The assumptions and uncertainties regarding future improvements scenarios | Worst case assumptions relating to these factors are presented in Appendix 9.3. |
### Technical engagement

9.3.5 Technical engagement has been ongoing with a number of prescribed and non-prescribed consultation bodies in relation to GHG emissions. A summary of engagement undertaken is outlined in this section.

### Environment Agency

9.3.6 Engagement with the Environment Agency began on 23 April 2018 in the form of a presentation of the scope and methodology of the GHG emissions assessment.

9.3.7 The purpose of the engagement with the Environment Agency was to describe and discuss the methodology as described in Section 9.7. There were no comments or alterations to the methodology as a result of the engagement.
Engagement with the Heathrow Strategic Planning Group (HSPG) began on 10 May 2018 in the form of a presentation of the scope of the GHG emissions assessment.

The purpose of the engagement with the HSPG was to describe and discuss the methodology as described in Section 9.7. There were no comments or alterations to the methodology as a result of the engagement.

Further engagement was carried out on 22 January 2019, where the scope and assessment methodology were presented in more detail, including a description of how significance and alignment with UK carbon budgets are addressed. The HSPG had no comments at that stage, and technical engagement between Heathrow and the HSPG is ongoing.

A meeting was held with the CAA on 14 January 2019 to discuss the DCO Project including their response to the Heathrow EIA Scoping Report (May 2018) on the carbon and GHG emissions assessment.

The proposed approach for assessing carbon dioxide (CO$_2$) emissions from air transport was presented with a focus on the scope of activities to be assessed, the disaggregation of results and emission factor to be used for aviation fuel.

The discussion focused on the principle that CO$_2$ emissions from arriving flights that were affected by airspace change do not need to be assessed in PEIR and would be considered through the airspace change process, and the CO$_2$ emission factor for aviation fuel should be 3.15kgCO$_2$ per kilogram of aviation fuel, to be in accordance with DfT guidance.

**9.4 Scope of the assessment**

This section describes the activities included in the scope of the assessment along with the spatial and temporal scope as it applies to GHG emissions. This section also describes the receptor for which the preliminary assessment has been undertaken. The scope has been developed as the DCO Project has evolved and responds to feedback received from PINS in the Scoping Opinion and through technical engagement. The information presented in the PEIR is by its nature preliminary and should not be considered a ‘draft’ ES (in accordance with Planning Inspectorate Advice Note 7).
9.4.2 It is noted that further scope refinement may be required between this PEIR and the ES to take full account of the preferred masterplan, statutory and non-statutory consultation feedback, and subsequent engagement and agreements with stakeholders.

Activities and potential significant effects requiring assessment

9.4.3 The GHG emitting activities fall into four sub-aspects, as set out at paragraph 5.74 of the ANPS:

1. Construction (refer to Appendix 9.2)
2. Air transport (international and domestic) (refer to Appendix 9.3)
3. Surface access (refer to Appendix 9.4)
4. Airport buildings and ground operations (refer to Appendix 9.5).

9.4.4 The GHG emitting activities in the assessment are summarised in Table 9.5. Further detailed description of these activities and what has been included in the scope of the assessment are described in Appendices 9.2 to 9.5.

9.4.5 As set out in the Heathrow EIA Scoping Report (May 2018), all design components have been considered in this assessment, for both the construction and operation development phases. These design components include runways and taxiways, terminals and aprons, M25 motorway, other road diversions, public transport, rivers and flood storage, and airport supporting development.

Table 9.5: GHG emitting activities scoped in for assessment

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Activity</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>The manufacture and production of construction materials</td>
<td>GHG emissions associated with the manufacturing of construction materials (for example, concrete and steel). GHG emissions will be associated with the extraction or mining of resources and any primary and secondary processing or manufacturing. The creation of new assets and changes to existing assets will result in indirect GHG emissions.</td>
</tr>
<tr>
<td>Construction</td>
<td>Construction material transport and worker transportation and logistics</td>
<td>GHG emissions associated with vehicles used for the delivery of construction materials to site, removal of construction waste and construction staff travel. These activities will likely use vehicles with internal combustion engines and therefore lead to GHG emissions.</td>
</tr>
<tr>
<td>Construction</td>
<td>Construction site works</td>
<td>GHG emissions associated with construction site works relate to the fuel and electricity used by on-site plant and equipment during construction. Construction related activities include fuel used to power heavy</td>
</tr>
</tbody>
</table>

© Heathrow Airport Limited 2019
### Land use change (to be assessed in the ES)

- Machinery like diggers and tracked excavators, or electricity to provide lighting and heating for construction site cabins. There will also be the need for temporary worker accommodation, lighting and power which will lead to GHG emissions associated with energy and water consumption.
- The majority of land use change will take place during the excavation and construction phase of the DCO Project, where existing land use types (such as grassland) may be permanently lost to allow for the DCO Project. The land use change assessment will capture GHG emissions associated with the following impacts:
  1. Where existing 'carbon sinks', such as grassland or forested land, are lost to allow for the DCO Project, stored carbon will be released.
  2. New green spaces, provided as part of landscaping and biodiversity measures, will act to sequester carbon.

### Operation

#### Air Transport

- **Climb, Cruise and Descent (CCD), (departures only)**
  - GHG emissions occur from burning of aircraft fuel. The advice of the CCC (Committee on Climate Change) is to consider only CO\(_2\) emissions from air transportation (irrespective if they are emitted on the ground or at altitude). The rate of fuel consumption and therefore the amount of CO\(_2\) emissions produced differs between aircraft types and in the different phases of a flight. The LTO cycle includes emissions from arrivals and departures of aircraft on the airfield and from take offs and landings up to 3000ft as well as emissions from APUs. Departing flights above 3000ft are referred to as CCD. Emissions from arrivals above 3000ft are accounted for by the country of the originating flight if an international flight and of the originating UK airport if a domestic flight. This is the convention adopted by the UK in reporting international aviation emissions and the basis of assessments underpinning the ANPS.

- **LTO cycle including emissions from Auxiliary Power Units (APUs)**

#### Surface access

- **Movement of passengers, visitors, colleagues (including retail) and freight (including retail).**
  - GHG emissions associated with surface access occur due to the consumption of fuel for vehicle movements. Total emissions depend on the number of transport movements, the distance travelled for each movement and the mixture of transport modes (road and rail access) used over time.

#### Airport buildings

- **Buildings, infrastructure**
  - GHG emissions from electricity, natural gas, biomass and diesel/petrol consumption. These fuels are...
### Greenhouse gases assessed

#### Air transport

9.4.6 Aircraft engines emit CO\(_2\) as well as other emissions such as nitrogen oxide (NO\(_x\)), particulates, sulphates and water vapour (typically referred to as non-CO\(_2\) emissions). These non-CO\(_2\) emissions\(^4\) are considered by the DfT to potentially have a radiative forcing effect (contribute to climate change) if emitted at altitude.

9.4.7 There is, however, no scientific consensus on the effect of non-CO\(_2\) emissions at altitude at present. The advice of the CCC (CCC, 2009 and CCC, 2012) is to consider only CO\(_2\) emissions from air transportation (irrespective of whether they are emitted on the ground or at altitude) until there is improved scientific evidence available.

9.4.8 This advice has been adopted by the DfT (DfT, 2017) and has informed its policy on aviation and climate change and formed the basis of the assessment produced in support of the ANPS.

9.4.9 The recently published consultation on policy proposals for the Aviation 2050 strategy reconfirms this position. Paragraph 3.95 of the Aviation 2050 strategy states that:

*The government proposes: to keep non-CO\(_2\) emissions under review and reassess the UK’s policy position as more evidence becomes available*

9.4.10 This air transport assessment, unlike the GHG emission assessments for the other three sub-aspects, therefore considers only CO\(_2\) emissions. There is further detail on this subject in Appendix 9.3.

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\(^4\) Some of these non-CO\(_2\) emissions if emitted at ground level, for example NO\(_x\), are considered to be GHG for the purposes of the CCA, although some, for example water vapour, are not.
Construction, surface access, and airport buildings and ground operation

9.4.11 The GHG emissions assessments completed for sub-aspects other than air transport included consideration of GHGs additional to carbon dioxide. As determined by the Kyoto Protocol these GHGs include seven gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. To provide consistent reporting of these gases, each is weighted by its global warming potential and converted to a carbon dioxide equivalent (CO$_2$e) in accordance with GHG reporting protocol$^5$.

Spatial scope

9.4.12 The spatial scope is the area over which changes to the environment are likely to occur. GHG emissions are not limited to specific geographic boundaries as the receptor is the global atmosphere. Therefore, the spatial scope for the assessment can be considered to be global in its extent.

Study area

9.4.13 The study area of the GHG emissions assessment is defined by the location and type of activities associated with the construction and operation of the DCO Project. The assessment has captured both direct and indirect GHG emissions from activities within and beyond Heathrow. A further description of how study area considerations have applied to the four sub-aspects included in this assessment is provided in this section.

Construction

9.4.14 The study area for the construction assessment includes construction-related activities that occur within the draft DCO limits, such as development of new airport facilities and land use change.

9.4.15 Emissions have been quantified that are associated with some activities supporting construction, which occur outside the draft DCO limits, for example GHG emissions from construction related transport (including workers and materials).

9.4.16 Similarly, the quantification of indirect emissions resulting from construction activities includes emissions associated with production, manufacture and refining of construction materials, regardless of the location where these activities occur.

9.4.17 Graphic 9.1 depicts the activities associated with construction.

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$^5$ By definition, one unit of CO$_2$ is equivalent to one unit of CO$_2$e and therefore no unit conversion is needed to sum CO$_2$ and CO$_2$e values together.
Graphic 9.1: Construction activities
Air transport

9.4.18 The study area for the assessment of CO₂ emissions from air transport includes aircraft that take-off or land at Heathrow. The portion of each aircraft movement that has been included in the assessment is not defined by a spatial boundary but by specific stages in the aircraft flight cycle. As stated in Table 9.5, the assessment considers the LTO cycle (including APU emissions) and departing aircraft in the CCD phase.

9.4.19 Graphic 9.2 shows the activities associated with the LTO cycle (including APU emissions), and Graphic 9.3 shows those associated with the CCD phase.
Surface access

9.4.20 The study area for the assessment of GHG emissions from surface access extends to journeys made by employees, visitors, passengers and freight to access Heathrow from across the UK, as informed by the Preliminary Transport Information Report (PTIR).

9.4.21 **Graphic 9.4** shows the activities associated with surface access, which largely occur outside Heathrow.

**Graphic 9.4: Surface access activities**

Airport buildings and ground operation

9.4.22 The study area for activities assessed for the airport buildings and ground operations is within or in near proximity to Heathrow. The quantification of indirect emissions includes emissions associated with service provision in support of Heathrow operations, regardless of the location where these activities occur. This
includes operations over which Heathrow does not have direct control, such as operations by third-party businesses. Graphic 9.5 depicts the activities associated with the airport buildings and ground operations.

**Temporal scope**

9.4.24 The temporal scope of the GHG emissions assessment for all activities is from c.2022 to 2050. This temporal scope extends across the three phases of the DCO Project, as outlined in Chapter 5: Approach to the EIA. The DCO Project is complicated by having both construction and operational activities often occurring at the same time.

9.4.25 In Phases 1 to 3 there are years which are subject to detailed assessment as they represent key milestones in the DCO Project. These have been defined as being:

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6 Heathrow’s annual carbon footprint report, which is used to inform the current baseline in this assessment, adopts the GHG Protocol ‘Operational Control’ approach and therefore does not report all third-party operations that are included in the scope for the EIA.
1. 2025 – referred to as ‘year of maximum release of first phase of capacity’ – the year at which the maximum number of early ATMs are operating for the first time and during a period where construction activities are intensive.

2. 2027 – referred to as ‘first full year of third runway operations’ – the first full calendar year when the new third runway is operational. During this year construction activities will continue.

3. 2035 – referred to as ‘year of minimum ANPS capacity’ – the likely year when the DCO Project will deliver the base ANPS requirement of 740,000 ATMs.

4. 2050 – referred to as ‘year of maximum ATM capacity’ – the year when the runway will have reached its maximum forecasted ATM capacity.

In particular, 2050 is a relevant year for the GHG emissions assessment as the emissions in that year are required to satisfy an ANPS policy requirement of assessing against UK carbon targets and budgets (ANPS paragraph 5.76).

The ANPS also requires the assessment of the worst-case year (interpreted as the year of peak emissions) and the assessment of aggregated emissions over the whole assessment period (ANPS paragraph 5.77).

Therefore, the GHG emissions assessment has estimated annual GHG emissions for every year between 2022 and 2050.

Outside of the assessment period of 2022 to 2050, ‘current baseline’ data has been presented using recent Heathrow GHG reporting, predominantly using data reported for 2017.

**Assessment scenarios**

The ANPS states that the GHG emissions assessment:

“**should be undertaken in both a ‘do minimum’ and also in the ‘do something’ scenario for the opening, peak operation, and worst-case scenarios**” (paragraph 5.77).

Do minimum has been interpreted as the ‘no expansion’ 2R future baseline case, hereafter referred to as ‘future baseline’. Do something is hereafter referred to as the ‘DCO Project’.

The ANPS also states that:

“**the applicant should quantify the greenhouse gas impacts before and after mitigation to show the impacts of the proposed mitigation**” (paragraph 5.76).

This has been interpreted as two distinct DCO scenarios – the DCO Project without mitigation and the DCO Project with mitigation. It is noted that, in general, the term ‘mitigation’ has not been adopted in this PEIR. For carbon and other
GHG, the scenarios have been labelled using the term ‘mitigation’, as it is a specific ANPS requirement to report GHG impacts before and after mitigation.

However, ‘environmental measures’ is the terminology generally adopted across this PEIR rather than ‘mitigation’. Section 9.8 of this PEIR provides more detail on the environmental measures included in each of the scenarios.

This PEIR chapter reports on the GHG emissions associated with the future baseline and DCO Project without mitigation scenarios for all activities.

At this preliminary stage, the DCO Project with mitigation scenario has only been reported quantitatively for surface access, because the environmental measures in the SAP have been sufficiently developed to be embedded within model assumptions. The DCO Project with mitigation scenario will be fully assessed and reported in the ES for all sub-aspects.

In summary the PEIR GHG emissions assessment reports on two scenarios over the full assessment period (from 2022 to 2050):

1. **Future baseline**: Heathrow continues to be capped at 480,000 ATMs with two runways

2. **DCO Project without mitigation**: three runway scenario, without further operational measures.

In this PEIR, the GHG emissions are quantified for the third scenario for surface access only:

3. **DCO Project with mitigation**: three runway scenario, including further operational measures.

**Reasonable worst case**

As outlined in Chapter 5, in order to provide appropriate flexibility in the design of the DCO Project post-grant of the DCO and, at the same time maintain a robust EIA process, a reasonable worst-case approach has been adopted across all three GHG emissions assessment scenarios.

A reasonable worst-case approach has been interpreted as aligning with current practice extrapolated to 2050, and where relevant, incorporating conservative future efficiencies observed from Government and sectorial policy trends to 2050.

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7 The scenario labels should not be interpreted as literal descriptions of each scenario, for example, the DCO Project without mitigation scenario includes a range of environmental measures that are an inherent part of the preferred masterplan design.
Receptors

9.4.41 For detail on the assumptions underpinning the GHG emissions assessment (including assumptions behind the project parameters) refer to Section 9.6 and Appendices 9.2 to 9.5.

9.4.42 The receptor for all GHG emissions is the global atmosphere, where they contribute to climate change. How the DCO Project responds to the effects of climate change in terms of resilience and impacts upon environmental receptors is described in Chapter 10: Climate change.

9.5 Assumptions and limitations of this PEIR

Overview

9.5.1 This section presents the assumptions and limitations for the GHG emissions assessment. The types of assumptions and limitations set out in this section are common to the GHG emissions quantification undertaken for all activities.

9.5.2 Assumptions and limitations relevant to specific sub-aspects are described in Appendices 9.2 to 9.5.

9.5.3 The temporal scope of this assessment extends to 2050, meaning that assumptions have been made for activities occurring over three decades into the future. These assumptions include emissions factors for a diverse range of activities.

9.5.4 The trajectory of emissions factors into the future is dependent on influences outside of Heathrow’s control, for example Government policy and global technology and economic shifts. Therefore, there are inherent uncertainties in the assessment made of future GHG emissions.

9.5.5 To mitigate this uncertainty and ensure a robust assessment, assumptions have been made that can be considered reasonable worst case, using GHG factors and other assumptions from reputable sources and in line with Government policy. Assumptions used in this assessment are contained in Appendices 9.2 to 9.5.

9.5.6 The DCO Project design will develop and evolve, with the results of the GHG assessment likely to change. The GHG assessment will be updated in order to reflect changes to design and these will be reflected in the ES. The selection of reasonable worst-case assumptions has been made to provide sufficient flexibility for design decisions to change without altering the findings of this assessment.

9.5.7 As explained in Section 9.4, although the ANPS requires quantification of the effect of proposed environmental measures on GHG emissions, a DCO Project with mitigation scenario has not been assessed quantitatively in this PEIR, with the
exception of surface access. Environmental measures have been identified in this PEIR and their effects will be assessed and reported in the ES for all sub-aspects.

9.6 **Current baseline**

**Overview**

9.6.1 The current baseline refers to Heathrow’s current GHG emissions and has been used in the assessment in the following ways:

1. To provide context for the future modelled GHG emissions assessment
2. To inform the assumptions that were used in the modelling of future GHG emissions
3. To enable comparison of Heathrow’s current GHG emissions with current UK GHG emissions, which are relevant for some aspects of the ANPS requirements.

9.6.2 The current baseline has not been used directly in the assessment of significant effects from the DCO Project. To assess the GHG emissions impact of the DCO Project, the estimated GHG emissions from the DCO Project have been compared with the future baseline, as is standard practice when undertaking EIA.

**Methodology for current baseline data gathering**

9.6.3 Heathrow reports its GHG emissions annually with data collected and reported in a way that is consistent with Airport Carbon Accreditation (ACA) and largely aligned to the GHG Protocol. The ACA is an internationally recognised carbon management certification standard for airports, with accredited airports worldwide. The GHG Protocol provides globally used GHG accounting standards and tools for companies, cities, products and projects.

9.6.4 Baseline data collection has been undertaken to obtain information for the sub-aspects described in **Section 9.4**. This section provides the approach adopted to collect baseline data. 2017 was the most recently reported year at the time of preparation of this PEIR. Construction GHG emissions have not been included in the current baseline assessment as Heathrow do notCurrently report on supply chain construction GHG emissions.

9.6.5 A summary of the data which has informed the GHG emissions baseline is outlined in **Table 9.6**.
Table 9.6: Data sources used to inform the GHG emissions for the current baseline assessment

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Data provided</th>
<th>Data time period</th>
<th>Date received (date)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Air transport</strong></td>
<td>Data on aircraft movements, destinations, aircraft registration, engine type and number of engines.</td>
<td>Calendar year 2017</td>
<td>07 June 2018 (aircraft data)</td>
</tr>
<tr>
<td></td>
<td>Aircraft time in mode data including use of APUs</td>
<td>Calendar year 2017</td>
<td>05 June 2018</td>
</tr>
<tr>
<td><strong>Surface access transport</strong></td>
<td>Output data from London Airports Surface Access Model (LASAM) on passenger surface access journeys. Output from Heathrow Employee Mode Choice Model (HEM-CM) on colleagues' surface access journeys Output from Heathrow Highway Assignment and Surface Access Model (HHASAM) on freight surface access journeys</td>
<td>Calendar year 2017</td>
<td>27 July 2018 (LASAM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>24 July 2018 (HEM-CM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18 January 2019 (HHASAM)</td>
</tr>
<tr>
<td><strong>Airport buildings and ground operations</strong></td>
<td>EU ETS performance data (utilities fuel consumption)</td>
<td>Calendar year 2017</td>
<td>08 June 2018 (EU ETS)</td>
</tr>
<tr>
<td></td>
<td>Gas and electricity meter readings for the Heathrow Express Depot</td>
<td>Calendar year 2017</td>
<td>23 July 2018</td>
</tr>
<tr>
<td></td>
<td>Refrigerant top up records(^9)</td>
<td>Calendar year 2017</td>
<td>28 February 2018</td>
</tr>
<tr>
<td></td>
<td>Waste data</td>
<td>Calendar year 2017 and 2018</td>
<td>8 January, 10 July and 15 August 2018</td>
</tr>
<tr>
<td></td>
<td>Current terminal building areas</td>
<td>2017</td>
<td>24 July 2018</td>
</tr>
<tr>
<td></td>
<td>Energy consumption data and breakdown (electricity, gas, biomass, diesel, etc.)</td>
<td>2017</td>
<td>12 July 2018</td>
</tr>
<tr>
<td></td>
<td>Non-potable water use</td>
<td>2015</td>
<td>10 May 2017</td>
</tr>
<tr>
<td></td>
<td>Potable water use</td>
<td>2015</td>
<td>10 May 2017</td>
</tr>
<tr>
<td></td>
<td>Cooling water use</td>
<td>2015</td>
<td>10 May 2017</td>
</tr>
<tr>
<td></td>
<td>Operational vehicle fuel consumption data.</td>
<td>2017</td>
<td>24 May 2018</td>
</tr>
</tbody>
</table>

9.6.6 The current baseline GHG emissions quantification method differs slightly from how emissions are quantified in the future baseline and DCO Project scenarios, as measured reported data is available for many of the current baseline activities, for

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\(^8\) Note that for some activities, the most recent data available may have been for a year other than the reporting year (2017). Where data for earlier years has been used, it has either been directly substituted for 2017 or had an appropriate scaling adjustment made. While utilising data from the reporting year is preferable, this approach is common in GHG emissions reporting where data is not available.

\(^9\) Assumptions were made regarding data on refrigerant top ups. This was extrapolated to account for the fact that the data provided covered only 30% of the estate.
example energy consumption (see Table 9.6 for baseline data collection). In comparison, the future baseline and DCO Project scenarios rely on projections and data modelling to estimate future emissions.

9.6.7 The scope of the PEIR assessment is broader than the scope of Heathrow’s annual carbon footprint in the case of the water and waste components of the airport buildings and ground operations sub-aspect. The PEIR assessment includes operations over which Heathrow does not have direct control, such as operations by third-party businesses, whereas Heathrow’s annual carbon footprint does not report third-party emissions associated with waste and water.10

9.6.8 For more detail on the baseline GHG emissions assessment methodology refer to Appendix 9.1.

Current baseline assessment

9.6.9 Current baseline GHG emissions have been estimated at 20.8 million tonnes of CO\textsubscript{2}e (MtCO\textsubscript{2}e). Air transport accounts for over 95% of Heathrow’s GHG emissions followed by surface access transport at 3%. Table 9.7 presents Heathrow’s baseline GHG emissions by sub-aspect and includes published results for 2015 and 2016 for context, noting that not all activities were reported in these earlier years: the additional activity included is the air transport CCD phase (which is 90% of the 2017 footprint).

10 Heathrow 2017 carbon footprint assessment used for the current baseline adopts the GHG Protocol ‘Operational Control’ approach under which a company accounts for 100% of emissions from operations over which it or one of its subsidiaries has operational control. This is a narrower scope than used for the EIA.
Table 9.7: Current baseline GHG emissions by activity (2015, 2016 and 2017)\textsuperscript{11}

<table>
<thead>
<tr>
<th>Sub-aspect and activity</th>
<th>2015 GHG emissions \textsuperscript{a} (CCD not quantified)</th>
<th>2016 GHG emissions</th>
<th>2017 GHG emissions</th>
<th>Emissions unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air transport</td>
<td>19.51</td>
<td>20.10\textsuperscript{12}</td>
<td>MtCO\textsubscript{2}\textsuperscript{13}</td>
<td></td>
</tr>
<tr>
<td>- LTO phase including APUs</td>
<td>1.26</td>
<td>1.30</td>
<td>1.32</td>
<td>MtCO\textsubscript{2}</td>
</tr>
<tr>
<td>- CCD phase</td>
<td>(CCD not quantified)</td>
<td>18.21\textsuperscript{b}</td>
<td>18.78\textsuperscript{b}</td>
<td>MtCO\textsubscript{2}</td>
</tr>
<tr>
<td>Surface access transport</td>
<td>0.72</td>
<td>0.70</td>
<td>0.63</td>
<td>MtCO\textsubscript{2e}</td>
</tr>
<tr>
<td>Airport buildings and ground operations\textsuperscript{14}</td>
<td>0.20</td>
<td>0.18</td>
<td>0.09</td>
<td>MtCO\textsubscript{2e}</td>
</tr>
<tr>
<td>TOTAL (excluding CCD)</td>
<td>2.19</td>
<td>2.18</td>
<td>2.05</td>
<td>MtCO\textsubscript{2e}</td>
</tr>
<tr>
<td>TOTAL (including CCD)</td>
<td>(CCD not quantified)</td>
<td>20.39</td>
<td>20.83</td>
<td>MtCO\textsubscript{2e}\textsuperscript{15}</td>
</tr>
</tbody>
</table>

Sources:
\textsuperscript{a} Heathrow Carbon Footprint 2017
\textsuperscript{b} DfT Aviation Forecasts 2017

9.6.10 Table 9.8 presents the UK’s total GHG emissions by sector in 2017 (BEIS, 2019). UK GHG emissions are also referred to in Section 9.13 to contextualise current baseline GHG emissions when assessing impact on government carbon reduction targets and carbon budgets.

9.6.11 Reference to Table 9.7 and Table 9.8 shows that in 2017, GHG emissions from international flights departing Heathrow (19.9MtCO\textsubscript{2}) were 58% of total UK international flight emissions (34.6MtCO\textsubscript{2}).

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\textsuperscript{11} Heathrow 2017 carbon footprint assessment is published and available online. Note that air transport data in the published footprint was presented in CO\textsubscript{2e}, without CCD phase. LTO emissions in Table 9.7 are for CO\textsubscript{2} only and therefore differ from the Heathrow published figures.

\textsuperscript{12} Of which 0.165 million tonnes are from domestic air transport and 19.922 million tonnes are from international air transport.

\textsuperscript{13} Aviation emissions are reported in terms of tonnes of carbon dioxide (CO\textsubscript{2}) and not as carbon dioxide equivalents (CO\textsubscript{2e}) as explained in Section 9.4.

\textsuperscript{14} Results presented do not include GHG emissions associated with waste and water from third party businesses, which are included in future baseline and DCO Project without mitigation results.

\textsuperscript{15} By the way CO\textsubscript{2e} is defined, 1 ton of CO\textsubscript{2} is equal to 1 ton of CO\textsubscript{2e}. No conversion is needed to sum together CO\textsubscript{2} and CO\textsubscript{2e}. 
### Table 9.8: UK GHG emissions by sector (2017)

<table>
<thead>
<tr>
<th>Sector</th>
<th>GHG emissions</th>
<th>Emissions unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Supply</td>
<td>106.0</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Business</td>
<td>66.1</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Transport(^{16})</td>
<td>124.6</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Public</td>
<td>7.8</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Residential</td>
<td>64.1</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Agriculture</td>
<td>5.6</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Industrial process</td>
<td>10.2</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Waste management</td>
<td>0.3</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Land use, land use change and forestry</td>
<td>-11.3</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Total CO₂</td>
<td>373.2</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>Other GHG emissions</td>
<td>87.0</td>
<td>MtCO₂e</td>
</tr>
<tr>
<td><strong>Total GHG emissions (excluding international aviation)</strong></td>
<td><strong>460.2</strong></td>
<td>MtCO₂e</td>
</tr>
<tr>
<td>International aviation (CO₂ emissions)</td>
<td>34.6</td>
<td>MtCO₂</td>
</tr>
<tr>
<td>International aviation (other GHG emissions)</td>
<td>0.3</td>
<td>MtCO₂e</td>
</tr>
<tr>
<td><strong>Total GHG emissions (including international aviation)</strong></td>
<td><strong>495.2</strong></td>
<td>MtCO₂e</td>
</tr>
</tbody>
</table>

### 9.7 GHG emissions quantification methodology for PEIR

**Overview**

9.7.1 The generic project-wide approach to the assessment methodology is set out in Chapter 5, which has informed the approach used in this GHG emissions assessment. The assessment is further guided by the current baseline GHG emissions outlined in Table 9.7.

9.7.2 This section sets out the methodology for quantifying the GHG emissions from the four sub-aspects: construction, air transport, surface access transport, and airport buildings and ground operations.

9.7.3 The methodology for assessing likely significant effects is described in Section 9.11.

9.7.4 The methodology for assessing the effect of the DCO Project on UK government carbon reduction targets and carbon budgets is described in Section 9.13. This assessment has been conducted in response to an ANPS requirement for assessment (paragraph 5.76 and 5.77) and is distinct from the assessment of significant effects.

9.7.5 At this stage in the EIA process, the DCO Project is still under development and is the subject of statutory consultation. The likely GHG emissions are still presented

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\(^{16}\) Transport includes domestic aviation and shipping.
9.7.6 The methodology for the ES GHG quantification may therefore develop further from that used for this PEIR. Anticipated changes in the GHG emissions quantification methodology are summarised in Table 9.9, with the reasons for any likely methodological changes detailed.

Table 9.9: GHG emissions quantification methodology for the PEIR and EIA

<table>
<thead>
<tr>
<th>Effect</th>
<th>Quantification methodology used for this PEIR</th>
<th>Quantification methodology to be used for the EIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>GHG emissions</td>
<td>GHG emissions quantification has been based upon preliminary design information and relying on reasonable assumptions where necessary, in the absence of detailed design information.</td>
<td>The quantification of GHG emissions will be based upon the DCO Project design.</td>
</tr>
<tr>
<td>GHG emissions from the DCO Project with mitigation scenario</td>
<td>Environmental measures have been identified which will be developed further for inclusion in the ‘with mitigation’ scenario for the full ES. At this stage, quantification of GHG emissions in the DCO Project with mitigation scenario has not been completed, with the exception of surface access.</td>
<td>Quantification of the DCO Project with mitigation scenario will be based upon confirmed environmental measures.</td>
</tr>
</tbody>
</table>

9.7.7 Tailored approaches have been used to quantify the GHG emissions from the construction and operation phases of the DCO Project covering the four sub-aspects.

9.7.8 Although the approach to quantifying GHG emissions varies by activity, a broadly common approach has been used to quantify the GHG emissions for all activities assessed. The following generalised formula has been used to quantify the GHG emissions for any given activity during an assessment year:
Equation 1: GHG emissions quantification

\[ AD \times UCF \times GHGF = GHG \text{ or } CO_2 \text{ per year} \]

where

- **AD** = activity data for assessment year (units vary by activity)
- **UCF** = Unit conversion factor(s), used to convert measurement units or time units
- **GHGF** = GHG factor
- **GHG** = GHG emissions in units of tonnes of carbon dioxide equivalent
- **CO_2** = Carbon dioxide emissions in units of tonnes of carbon dioxide

For example:

Annual building electricity consumption (kWh) \( \times \) UK electricity conversion factor (tCO_2e / kWh) = tCO_2e per year

9.7.9 The source, type and level of detail of the activity data varies by activity. In general, the activity data is driven by the DCO Project design.

9.7.10 The quantification provides an estimate of GHG emissions from an activity occurring in a given assessment year. This quantification has been repeated for:

1. Each of the activities within the scope of this assessment
2. Each of the assessment years from 2022 to 2050, noting that if activity data was not available directly for every assessment year then interpolation has been undertaken
3. Each of the assessment scenarios assessed (future baseline, DCO Project without mitigation, plus DCO Project with mitigation in the case of surface access).

9.7.11 By following this methodology, a profile of annual GHG emissions has been generated for each activity from 2022 to 2050 for each assessment scenario.

9.7.12 These annual GHG emissions estimates for each activity have also been aggregated (summed) to assess:

1. The total GHG emissions across multiple activities in each assessment year (either in total or for a sub-aspect)
2. The total GHG emissions over the whole assessment period (from 2022 to 2050).
A summary of the GHG quantification methodology for each of the four sub-aspects is provided in this section. Further detail on the approaches for each activity are set out in Appendices 9.2 to 9.5.

**Construction emissions**

The quantification of construction GHG emissions has adopted a life cycle assessment (LCA) approach in line with the principles set out in BS EN 15978:2011 (November 2011) and PAS 2080:2016 (May 2016), capturing both direct and indirect emissions associated with construction. A ‘cradle to completed construction’ GHG emissions assessment has been undertaken for the DCO Project.

The quantification of construction GHG emissions is based on DCO Project data. Where this information has not been available, industry-wide GHG emissions assessment guidance information, such as the Royal Institution of Chartered Surveyors (RICS) Whole Life Carbon Assessment for the Built Environment has also been used to inform assumptions on type and specification of construction materials.

A description of the activity data used to assess the construction GHG emissions is summarised in this section. Appropriate industry accepted GHG factors have been applied to each activity. Further detail on the methodology for assessing construction emissions is provided in Appendix 9.2.

**Manufacture and production of construction materials**

GHG emissions associated with the manufacturing and production of construction materials are referred to as embodied emissions.

GHG emissions have been derived from projections of surface area (square metres) requirements for each construction material. The weight (tonnes) or volume (cubic metres) of construction material have been estimated by applying normalisation factors to this preliminary data.

**Construction material transport, worker transportation and logistics**

Construction material transport GHG emissions are generated by vehicles used for the delivery of construction materials to site. GHG emissions have been derived from the number of vehicle trips delivering construction material to site annually and the assumed distances travelled by the construction delivery vehicles. This aligns with the logistics assessment approach described in the Construction Proposal report which supports the PEIR.

Construction waste GHG emissions are generated by the transport and disposal of construction waste from site during construction. GHG emissions have been
derived from construction waste forecasts of the quantities of construction waste both diverted from landfill and disposed of at landfill.

9.7.21 Mass haul GHG emissions are generated by the movement of excavated soil during construction. GHG emissions are based on Heathrow analysis which includes the transport of arisings from excavation operations and demolition activities. This also includes movements between on-site borrow pits.

9.7.22 Construction worker transportation GHG emissions are generated by construction workers travelling to site. GHG emissions estimates have been based on the logistics strategy which provides number of workers required for construction combined with assumptions on the origin of the construction workers and their mode of travel.

Construction site works

9.7.23 Construction site works GHG emissions are generated by use of fuel and electricity by on site plant and equipment during construction.

9.7.24 GHG emissions from construction have been derived from monthly plant and equipment projections. The total number of plant and equipment on site per month has been estimated based upon this preliminary data.

Land use change

9.7.25 Land use change has not been included in the PEIR GHG assessment but will be part of the ES. The land use change assessment will capture GHG emissions associated with the following effects:

1. Where existing ‘carbon sinks’, such as grassland or forested land, are lost to allow for the DCO Project, stored carbon will be released

2. New green spaces, provided as part of landscaping and biodiversity measures, will act to sequester carbon.

9.7.26 The land use change assessment will be based on land use changes between the DCO Project scenario and the current (2017) baseline.

Air transport emissions

9.7.27 The quantification of air transport CO₂ emissions includes the LTO and CCD components as described in Section 9.4 and detailed further in Appendix 9.3

9.7.28 The LTO cycle describes all combustion related aircraft activity (from arrivals and departures) whilst on the ground (for example taxiing, hold, use of APUs etc.) and up to an altitude of 3,000ft (for example climb out and final descent), and CCD from departure flights whilst at 3,000ft or higher.
A summary of the assessment methodology and key assumptions is provided in this section, with further information provided in Appendix 9.3.

The methodology as presented quantifies gross CO₂ emissions from air transport activity. Gross emissions are CO₂ emissions before any offsets. The implications of UK aviation’s participation in CORSIA, the EU ETS, and Heathrow’s aspiration to ensure that growth from the new runway is carbon neutral (meaning that CO₂ emissions from additional flights after expansion would be offset through carbon credits) is considered in Section 9.16.

The calculation of CO₂ emissions from the LTO and CCD phases has considered four key modelling inputs:

1. Flight activity, which considers the time in mode for air transport movements over the LTO cycle including use of APUs and for CCD the Great Circle Distance (GCD) of the flights detailed in Heathrow’s ATM forecast schedules

2. Aircraft fuel consumption rates, derived from the EMEP/EEA (European Monitoring and Evaluation Programme / European Environment Agency) guidebook and additional Heathrow analysis to reflect fuel consumption rates of future aircraft types

3. Operational efficiencies to account for operational improvements related to likely future airline operational changes and the potential for wider airspace efficiency gains

4. Sustainable Aviation Fuel (SAF) emission factors, which reduce the CO₂ per kilogram of fuel compared to kerosene.

Surface access emissions

The ANPS refers specifically to surface access including airport and construction staff; freight and retail operations; passengers and visitors. Emissions from construction staff travel are quantified as part of construction activities.

The calculation of surface access GHG emissions has therefore included travel from airport and retail colleagues, cargo and retail freight, passengers and visitors, using the following modes of transport:

1. Private road vehicles
2. Taxis (including minicabs)
3. LGVs
4. HGVs
5. Buses and coaches

9.7.34 These modes are further divided into user classes and include petrol, diesel, and electric propelled vehicles\textsuperscript{17}.

9.7.35 The activity units used to calculate GHG emissions for each mode of transport are total vehicle kilometres travelled (for passenger and colleague private vehicles and freight vehicles) or passenger kilometres travelled (for passenger and colleague public transport). The quantification of activities has been completed using journey demand (number of journeys), distance and transport mode sourced from outputs of the Traffic and Transport models (HHASAM v2.0, LASAM v4.2 and HEM-CM v1.14).

9.7.36 For the modelling of future years, data manipulation of the activity data was required for some modes of transport to account for projected vehicle fleet mix, using WebTAG data (DfT, 2018) available for diesel, petrol, and electric vehicles, which shows increasing uptake of electric vehicles over time (up to 25% electric vehicles in 2050)\textsuperscript{18}.

9.7.37 The activity data was then multiplied by an appropriate emission factor for that mode of transport and assessment year. Further detail on the methodology for assessing construction emissions is provided in Appendix 9.4.

Airport buildings and ground operations

9.7.38 The calculation of airport buildings and ground operations GHG emissions covers the following activities:

1. Energy consumption, including fuel and electricity consumed in the airport buildings and ground operations, including that used by airside vehicles

2. Waste treatment


9.7.39 For water and waste, the assessment includes GHG emissions not included in Heathrow’s annual carbon footprint, such as those associated with third party businesses.

\textsuperscript{17} Standard UK transport emissions calculation methodology (WebTAG, DfT, 2018) was used; this takes account of the three main fuel types (diesel, petrol and electric). In reality, a fraction of vehicles will use alternative fuel sources, for example: liquefied petroleum gas (LPG), compressed natural gas (CNG) and hydrogen. This simplification of fuel types presents a reasonable worst case assumption (as alternative fuels generally have lower GHG emissions).

\textsuperscript{18} This assumption has been adopted as reasonable worst case. The rate of electric vehicle uptake in the DfT dataset is not as optimistic as some industry projections or government policy announcements.
9.7.40 Projections of future activity data have been generated using intensity metrics developed from the current baseline data described in Table 9.6. These intensity metrics have been factored to account for growth in passengers and air transport movements. The projections also include adjustments for inflation and assumptions of efficiency improvements. The assumptions that have been made are in line with those used in the energy, waste and water strategies for the DCO Project.

9.7.41 The activity data was then multiplied by an appropriate emission factor for that activity and assessment year\(^{19}\). Further detail on the methodology for assessing airport buildings and ground operations GHG emissions is provided in Appendix 9.5.

9.8 **Future baseline**

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**Overview**

9.8.1 The GHG emissions for the future baseline scenario have been quantified for the period from 2022 to 2050.

9.8.2 The future baseline annual GHG emission estimates are presented in Table 9.10 for the core and additional assessment years. This table shows results for each sub-aspect, with the air transport sub-aspect presented both including and excluding international air transport, as these are treated differently in UK policy. Future baseline emissions for the four sub-aspects excluding international air transport are also shown in Graphic 9.6.

9.8.3 With respect to on-airport development, the future baseline scenario includes works not within the scope of the DCO Project that are expected to be completed before construction of the DCO Project. These include the Kilobox Apron Development and Runway Access Taxiway project. This is in accordance with Planning Inspectorate Advice Note Seventeen. For further detail on the assessment of cumulative effects see Chapter 5, Section 5.8: Assessment of cumulative effects.

9.8.4 The quantification of GHG emissions shows that for the future baseline scenario:

1. Including international air transport emissions, projected GHG emissions peak in 2022 at 19.85Mt\(\text{CO}_2\text{e}/\text{year}

\(^{19}\) Some of the emission factors applied in the assessment, particularly relating to waste, differ from those used in Heathrow’s annual carbon footprint. The emissions factors applied in this assessment are considered to be reasonable worst case.
2. Excluding international air transport emissions, projected GHG emissions peak in 2022 at 1.20MtCO₂e/year.

Table 9.10: Future baseline annual GHG emission estimates for core and additional assessment years (including and excluding international air transport)

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Future baseline annual GHG emissions (MtCO₂e)¹</th>
<th>Year of maximum release of first phase of capacity</th>
<th>First full year of third runway operations</th>
<th>Year of minimum ANPS capacity</th>
<th>Year of maximum capacity²</th>
<th>Year of maximum GHG emissions³</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>No construction GHG emissions are included in the future baseline as all currently consented development is scheduled for completion before 2022.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air transport (including international air transport)</td>
<td>18.81 (2022)</td>
<td>17.98</td>
<td>17.66</td>
<td>16.17</td>
<td>12.37</td>
<td>18.81 (2022)</td>
</tr>
<tr>
<td>Air transport (excluding international air transport)</td>
<td>0.16 (2024)</td>
<td>0.17</td>
<td>0.17</td>
<td>0.15</td>
<td>0.13</td>
<td>0.17</td>
</tr>
<tr>
<td>Surface access</td>
<td>0.95 (2022)</td>
<td>0.94</td>
<td>0.93</td>
<td>0.92</td>
<td>0.91</td>
<td>0.95</td>
</tr>
<tr>
<td>Airport buildings and ground operations</td>
<td>0.09 (2022)</td>
<td>0.08</td>
<td>0.08</td>
<td>0.06</td>
<td>0.04</td>
<td>0.09</td>
</tr>
<tr>
<td>TOTAL (including international air transport)</td>
<td>19.85 (2022)</td>
<td>19.00</td>
<td>18.67</td>
<td>17.14</td>
<td>13.32</td>
<td>19.85 (2022)</td>
</tr>
<tr>
<td>TOTAL (excluding international air transport)</td>
<td>1.20 (2022)</td>
<td>1.19</td>
<td>1.17</td>
<td>1.12</td>
<td>1.07</td>
<td>1.20</td>
</tr>
</tbody>
</table>

¹ Air transport emissions are reported in units of MtCO₂.
² 2050 is also the year of the UK CCA 2008 target.
³ The year with the highest annual emissions is interpreted as the ‘worst case’ referenced in para 5.77 of the ANPS.
9.9 Embedded environmental measures

Overview

9.9.1 The DCO Project will consider a number of environmental measures to avoid or reduce likely significant effects. This approach is described in Chapter 5.

9.9.2 This section describes the environmental measures that Heathrow proposes to implement to manage the GHG effects of the DCO Project, including those that are an inherent part of the preferred masterplan design, plus further measures which will require action in order to achieve the desired outcomes and could be secured as part of the DCO process.

9.9.3 As set out in Section 9.4, two distinct DCO scenarios – the DCO Project without mitigation and the DCO Project with mitigation – have been developed to fulfil the ANPS requirements. The term ‘mitigation’ has been used for the scenario names used in this chapter to reflect the wording used in the ANPS. However, it is noted that in general, ‘environmental measures’ is the terminology adopted in this PEIR rather than ‘mitigation’. The use of the term mitigation in the labelling of the scenarios has been used solely to align with the language used in the ANPS and should not be interpreted as a literal description of the scenario.
9.43 The DCO Project without mitigation scenario includes environmental measures that are part of the physical infrastructure of the preferred masterplan, but does not include environmental measures which are not inherently part of the proposed infrastructure. Therefore, the DCO Project without mitigation scenario should not be interpreted as excluding environmental measures. A preliminary quantification of emissions for the DCO Project without mitigation scenario has been completed for all sub-aspects.

9.9.5 The DCO Project with mitigation scenario includes further environmental measures, in addition to the measures that are part of the physical infrastructure of the preferred masterplan, such as those relating to operational policies. GHG emissions for the DCO Project with mitigation scenario have not been quantified for all sub-aspects as part of this PEIR, as a number of environmental measures are at a preliminary stage of development.

9.9.6 The exception is surface access, where the effect of operational environmental measures has been quantified in this preliminary assessment. This is because the environmental measures in the SAP have been sufficiently developed to be embedded within model outputs.

9.9.7 GHG emissions for the DCO Project with mitigation scenario will be quantified in the ES for all sub-aspects.

9.9.8 In many cases, the environmental measures that reduce GHG emissions will have multiple benefits, as they are often related to greater resource efficiency. The environmental measures often reduce other effects, for example noise, air quality and health effects. To avoid duplication of reporting environmental measures across multiple chapters, only a concise summary of the most beneficial measures from a GHG perspective is provided in this chapter, with cross-references to other chapters where relevant.

**Measures included in the DCO Project without mitigation scenario**

9.9.9 Measures which are built into the DCO Project design are part of the physical infrastructure that is proposed to be constructed, meaning that it is not possible to meaningfully disaggregate the GHG savings of such measures. Specifically, an alternative design that does not include these measures has not been developed.

9.9.10 As such, the effects of physical masterplan design measures are included within the DCO Project without mitigation scenario. These measures are referred to as embedded environmental design measures.

9.9.11 Embedded environmental design measures that are particularly relevant to carbon and GHG emissions and are reflected in the projections for the DCO Project without mitigation scenario are set out in Table 9.11.
The DCO Project without mitigation scenario also takes into account wider industry improvements that are likely to occur independently of the DCO Project. This includes for example improvements in fuel efficiency of future aircraft and road vehicles, improved grid electricity generation factors, and improvements in embodied carbon of common construction materials such as steel and cement.

Table 9.11: Embedded environmental design measures

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Area of influence / activity</th>
<th>Environmental measure</th>
<th>Reference document(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Site logistics and transport</td>
<td>The railhead is intended to be the principal import facility for bulk materials, primarily aggregates, sand and cement for concrete production. Other materials and containerised goods for construction purposes may also be delivered by rail. Rail would also be used to export materials off-site where practicable. This will reduce the need for road vehicle trips and associated emissions.</td>
<td>Construction Proposals</td>
</tr>
<tr>
<td></td>
<td>Earthworks strategy</td>
<td>The earthworks strategy seeks to deliver the optimum balance between cut (excavated) and fill (deposited) materials. That is, a strategy which minimises the quantity of material needed to be imported onto site or exported off it. This has included identification of on-site borrow pits to source fill materials and subsequently reduce potential emissions associated with their transport.</td>
<td>Appendix 20.1: Draft Resource Management Plan, Volume 3</td>
</tr>
<tr>
<td>Air transport</td>
<td>Aircraft emissions (on the ground)</td>
<td>Heathrow will provide Fixed Electrical Ground Power (FEGP) for parked aircraft on new pier served and remote stands. This will minimise the need for aircraft to use their Auxiliary Power Unit (APU) whilst on-stand.</td>
<td>Chapter 6: DCO Project description</td>
</tr>
<tr>
<td></td>
<td>Aircraft emissions (on the ground)</td>
<td>The runway and taxiway system serving the new third runway and expanded airport has been designed to facilitate efficient airfield operations. Wherever practicable and consistent with airspace operations, arrivals and departures will be allocated to use the runway closest to the terminal they are using to minimise taxi distances and associated emissions. This runway allocation preference will be applied to each of the eight modes of operation.</td>
<td>Chapter 6: DCO Project description</td>
</tr>
<tr>
<td></td>
<td>Aircraft emissions (on the ground)</td>
<td>Heathrow will provide Pre-Conditioned Air (PCA) for new aircraft stands, where there is a clear business case and environmental benefit, given the intended occupancy of the stand.</td>
<td>Chapter 6: DCO Project description</td>
</tr>
</tbody>
</table>
### Sustainable Aviation Fuels

Heathrow have ensured that the masterplan fuel infrastructure is capable of facilitating the distribution of sustainable aviation fuels.

### Parking provision

The **SAP** include car parking proposals detailing how colleague vehicle reduction targets will be met (in association with the public transport proposals and colleague travel proposals) and passenger parking will increase, though not in line with growth in passenger numbers. Parking will be consolidated in three major Parkways:

1. Consolidated colleague and passenger parking in a Southern Parkway with good access from the M25 to serve the Western Campus (Terminal 5 and Terminal 5X);
2. Consolidated colleague and passenger parking in a Northern Parkway with good access from the M4 to serve the Eastern Campus (Terminal 1 and Terminal 2); and
3. Additional parking to support Terminal 4, accessible via Junction 14 of the M25 and the Southern Perimeter Road.

Car Hire and taxi and private hire waiting areas (the ‘Taxi Feeder Park’ and ‘Authorised Vehicle Area’) are proposed to be consolidated in an intensified multi-storey car park on the former Terminal 4 Landside Terminal Car Park, able to efficiently service both the western campus, Terminal 4 and CTA (via the proposed Southern Road Tunnel[^20]).

### Colleague travel

Employment uses, such as office and commercial uses have been located, where practicable, near public transport hubs. These include in close proximity to the Central Terminal Area and Hatton Cross rail terminus.

### Highway capacity

New and diverted road design has been developed to meet future capacity requirements and reduce the risk of additional congestion impacts.

### Low emission vehicles

Heathrow will provide infrastructure to facilitate the use of low emission airside equipment, such as electric vehicles. This includes for example, the

[^20]: The proposed Southern Road Tunnel is not included in modelling and quantification for the DCO Project without mitigation scenario, but is included for the DCO Project with mitigation scenario.
### Further measures included in the DCO Project with mitigation scenario

**9.9.13** The DCO Project with mitigation scenario includes further environmental measures that go beyond those that form an integral part of the masterplan design itself or those that would occur independently from the DCO Project, such as industry-wide improvements in performance. These further environmental measures to manage the GHG effects of the DCO Project remain under development at this stage and except for surface access have not been reflected in GHG emissions quantification within this PEIR.

### Surface access

**9.9.14** Operational environmental measures to reduce emissions from surface access are further developed than for other sub-aspects, with the measures forming part of the SAP. The SAP are not a fixed set of measures but a ‘toolbox’ which would be applied in response to ongoing monitoring of travel to Heathrow, a specified set of measures has informed the transport models used for this assessment. These are indicative and are subject to further development for ES.
The environmental measures in the SAP with the most significant GHG emissions reduction are set out in Table 9.12. Further details of the environmental measures assumed in the transport models are provided in the PTIR, Volume 1, Chapter 5.

The measures set out in Table 9.12 are included in the DCO Project with mitigation scenario and have been the subject of a preliminary assessment. The GHG saving effects have been quantified and are presented in Section 9.10.

Table 9.12: Surface access proposals to manage GHG effects (included in the preliminary DCO Project with mitigation scenario)

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Area of influence / activity</th>
<th>Framework of potential environmental measures</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface access</td>
<td>Emissions from passengers, visitors, colleagues and freight.</td>
<td>The SAP set out how access to the Airport by all travel modes will be managed to meet targets set out in the ANPS, as well as fulfilling Heathrow’s pledge not to increase airport-related traffic through expansion. The targets set out in the ANPS are: 1. To increase the proportion of journeys made to the airport by public transport, cycling and walking to achieve a public transport mode share of at least 50% by 2030 and at least 55% by 2040 for passengers; and 2. From a 2013 baseline level, achieve a 25% reduction of all staff car trips by 2030, and a reduction of 50% by 2040.</td>
<td>Surface Access Proposals</td>
</tr>
<tr>
<td>Surface access</td>
<td>Emissions from passengers, visitors, and colleagues.</td>
<td>The SAP include proposals for a road user charging strategy which sets out: 1. Proposals for a Heathrow Ultra Low Emissions Zone (HULEZ), to be introduced following the grant of a DCO. This would broadly mirror the standards of the current London Ultra Low Emissions Zone and would levy a charge on any passenger cars and private hire vehicles that do not comply with emissions standards (Euro 4 for petrol cars and Euro 6 for diesel) and 2. Proposals for the introduction of a vehicle access charge as the third runway is opened, to encourage passengers to travel by other modes.</td>
<td>Surface Access Proposals</td>
</tr>
<tr>
<td>Surface access</td>
<td>Emissions from passengers.</td>
<td>The SAP include public transport proposals which set out how the usage of existing and committed public transport to the airport will be increased through measures such as: 1. Improved ticketing</td>
<td>Surface Access Proposals</td>
</tr>
</tbody>
</table>

21 The proposed HULEZ was not included in the modelling assumptions for the GHG emissions assessment of the DCO Project with mitigation scenario. The assessment to be conducted as part of the ES will consider the proposed HULEZ.
## Framework of potential environmental measures

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Area of influence / activity</th>
<th>Framework of potential environmental measures</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>visitors and colleagues.</td>
<td>2. Cheaper fares on the Heathrow Express and earlier and later services</td>
<td><a href="#table-9-13">Table 9.13</a> and applies to all sub-aspects other than surface access. This list is likely to be updated and further refined as necessary.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. The new bus and coach services Heathrow is proposing to support</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Bus and coach priority measures(^{22})</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5. Support to the DfT and Network Rail to bring forward the proposed Western Rail Link to Heathrow and Southern rail schemes and provision of additional infrastructure at both the Terminal 5 and the CTA rail stations to support this</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6. Provision of additional capacity at both the Heathrow Central Bus Station and Terminal 5 Bus Station to support new bus and coach routes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface access</td>
<td>Emissions from colleagues.</td>
<td>The SAP include proposals in relation to colleague travel which set out the measures that will be introduced to encourage increased pedestrian and cycle access and use of public transport by colleagues(^{23}), such as:</td>
<td>Surface Access Proposals</td>
</tr>
<tr>
<td></td>
<td>1. Proposals to develop a ‘hub and spoke’ network of cycle routes</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Improvements to cycling facilities at the airport and on key routes from the airport to the surrounding area</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. The introduction of a needs-based framework for allocation of colleague car parking spaces, in the context of colleague car parking provision being reduced.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface access</td>
<td>Emissions from passengers.</td>
<td>The SAP include proposals to reduce the proportion of empty return trips for taxi and private hire vehicles.</td>
<td>Surface Access Proposals</td>
</tr>
<tr>
<td>Surface access</td>
<td>Emissions from freight.</td>
<td>The SAP include proposals to reduce the number of freight vehicle trips, such as vehicle call forward facilities, and virtual cargo consolidation.</td>
<td>Surface Access Proposals</td>
</tr>
</tbody>
</table>

### Construction, air transport, and airport buildings and ground operations

9.9.17 A framework of potential environmental measures is currently being developed which would be applied to ensure further reductions in GHG over and above those considered in the without mitigation scenario. The framework of potential environmental measures is described in **Table 9.13** and applies to all sub-aspects other than surface access. This list is likely to be updated and further refined as necessary.

---

\(^{22}\) For the GHG emissions assessment of the DCO Project with mitigation scenario, these include the use of the Southern Road Tunnel.

\(^{23}\) For the purpose of modelling colleague travel for the GHG emissions assessment of the DCO Project with mitigation scenario, a flat discount on public transport fares was assumed.
the DCO Project design develops and as feedback is received through the Airport Expansion Consultation (June 2019).

Table 9.13: Framework of potential environmental measures to manage GHG effects

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Area of influence / activity</th>
<th>Framework of potential environmental measures</th>
<th>Reference document(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Construction material selection</td>
<td>The carbon impacts of construction material and product selection will be considered, including the use of low carbon alternatives and secondary or recycled construction materials, as well as the carbon impacts of maintenance and replacement frequency where reasonably practicable.</td>
<td>Draft Code of Construction Practice</td>
</tr>
<tr>
<td></td>
<td>Site construction works</td>
<td>On-site construction carbon emissions will be reduced through careful selection of plant and construction activity approaches, including the use of low carbon efficient plant equipment and Construction Electricity Supply (CES) from grid electricity to reduce use of mobile generation where reasonably practicable.</td>
<td>Draft Code of Construction Practice</td>
</tr>
<tr>
<td></td>
<td>Site logistics and transport</td>
<td>Efficient movement of materials, workers, and waste to and from construction sites will be optimised through measures such as the use of rail freight for the delivery of materials to and from site and utilisation of alternative transport modes such as electric vehicles and water where reasonably practicable.</td>
<td>Draft Code of Construction Practice</td>
</tr>
<tr>
<td></td>
<td>Circular economy and minimise landfill</td>
<td>Circular economy principles, to fundamentally change the approach to materials and waste in construction, will be pursued as far as reasonably practicable.</td>
<td>Appendix 20.1: Draft Resource Management Plan, Volume 3</td>
</tr>
<tr>
<td></td>
<td>Water use during construction</td>
<td>Measures will be adopted that prioritise the use of non-potable water sources, such as rainwater and Heathrow’s existing borehole water supplies, for on-site non-potable purposes.</td>
<td>Draft Code of Construction Practice</td>
</tr>
<tr>
<td>Air transport</td>
<td>Carbon efficient aircraft</td>
<td>Heathrow’s current tariff structure (including landing charges) provide incentives to airlines to pay less for operating quieter, less polluting aircraft. Heathrow will review the tariff structure (including landing charges) to ensure that</td>
<td>-</td>
</tr>
</tbody>
</table>

24 Effects to be quantified in the DCO Project with mitigation scenario for ES.
<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>Area of influence / activity</th>
<th>Framework of potential environmental measures</th>
<th>Reference document(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon efficient aircraft</td>
<td>Airlines are encouraged to use more fuel-efficient aircraft. In addition, Heathrow will review whether additional metrics should be incorporated into the airport’s charging structure, and how the framework should evolve over time, in line with developments in technology.</td>
<td>Heathrow is exploring appropriate mechanisms which could be used in addition to landing charges to encourage take-up of new, more fuel-efficient aircraft into the fleet. This includes consideration of how sustainability metrics could potentially be incorporated within the local aircraft slot allocation rules/guidelines used at Heathrow. Heathrow are also engaging with Government and the slot allocation coordinator (ACL) to explore the potential for greater consideration of sustainability metrics to be included in the criteria used within the initial slot allocation process.</td>
<td>-</td>
</tr>
<tr>
<td>Aircraft operational efficiency on the ground.</td>
<td>In addition to providing infrastructure to facilitate the adoption of operational efficiency measures, Heathrow will continue to implement operational measures to reduce aircraft emissions on the ground and work with NATS and airlines to increase the application of reduced engine taxiing and reduced APU use where practicable and ensure that the airfield operates efficiently.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Operational efficiency in flight</td>
<td>Heathrow will continue to engage with Government, airlines and NATS to implement airspace modernisation, encouraging the development and use of improved operational measures over the flight phase.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Sustainable Aviation Fuels</td>
<td>Heathrow is exploring potential operational policies which could encourage the take up of sustainable aviation fuels by Heathrow operators, such as the evolution of landing charges in the future to include consideration of SAF. This is in addition to continuing to provide support to airline partners to develop the market for sustainable aviation fuels.</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Airport buildings and ground operations</td>
<td>The draft RMP includes measures to reduce energy use and incorporate more sustainable energy generation.</td>
<td>Appendix 20.1: Draft Resource Management Plan, Volume 3</td>
<td></td>
</tr>
<tr>
<td>Sub-aspect</td>
<td>Area of influence / activity</td>
<td>Framework of potential environmental measures</td>
<td>Reference document(s)</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Waste disposal and treatment</td>
<td>The draft RMP includes measures to manage the waste arisings in the construction and operational phases.</td>
<td>Appendix 20.1: Draft Resource Management Plan, Volume 3</td>
<td></td>
</tr>
<tr>
<td>Water consumption and treatment</td>
<td>The draft RMP includes measures to reduce water demand and improve water efficiency for all uses.</td>
<td>Appendix 20.1: Draft Resource Management Plan, Volume 3</td>
<td></td>
</tr>
</tbody>
</table>

9.9.18 The effect of the suite of measures proposed in Table 9.13 has not been quantified within the PEIR. In accordance with the ANPS, the ES submitted alongside the application for development consent will include quantification of the GHG effects associated with the full suite of proposed environmental measures, which will be considered in the DCO Project with mitigation scenario.

9.9.19 There are also additional environmental measures and compensation in place and under development that have not been included in the assessment but are relevant for understanding the wider context (Section 9.16). These strategies include offsetting of emissions.

9.10 Quantification of GHG emissions

Overview

9.10.1 GHG emissions have been quantified for two scenarios (the future baseline and the DCO Project without mitigation) for all sub-aspects in accordance with the methodology set out in Section 9.7.

9.10.2 The results demonstrate that international air transport is the greatest source of GHG emissions, contributing over 94% of aggregated emissions in each of the two scenarios.

9.10.3 The results in this section have been separately presented both including and excluding CO₂ from international air transport. This is because international air transport emissions are treated differently to other GHG emission sources in both international and UK policy.

9.10.4 Graphic 9.7 shows overall results (inclusive of international air transport) for the entire assessment period. The results show that for the DCO Project without mitigation scenario, emissions peak in 2035, at 26.42MtCO₂e/year.
9.10.5 **Graphic 9.8** shows overall results (including domestic air transport and excluding international air transport) for the entire assessment period. The results show that for the DCO Project without mitigation scenario, emissions peak in 2023, at 1.87MtCO₂e/year.
9.10.6 DCO Project without mitigation results for the core and additional assessment years are presented in Table 9.14, showing results for each sub-aspect, with the air transport sub-aspect presented including and excluding international air transport. DCO Project without mitigation emissions for the four sub-aspects excluding international air transport are also shown in Graphic 9.9.
### Table 9.14: DCO Project without mitigation annual GHG emission estimates for core and additional assessment years (including and excluding international air transport)

<table>
<thead>
<tr>
<th>Sub-aspect</th>
<th>DCO Project without mitigation Annual GHG Emissions (MtCO₂)¹</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First year of assessment</td>
<td>Year of maximum release of first phase of capacity</td>
</tr>
<tr>
<td>Construction</td>
<td>2022</td>
<td>2025</td>
</tr>
<tr>
<td>Air transport (including international air transport)</td>
<td>0.48</td>
<td>0.54</td>
</tr>
<tr>
<td>Air transport (excluding international air transport)</td>
<td>19.11</td>
<td>19.06</td>
</tr>
<tr>
<td>Surface access</td>
<td>0.16</td>
<td>0.18</td>
</tr>
<tr>
<td>Airport buildings and ground operations</td>
<td>0.95</td>
<td>0.97</td>
</tr>
<tr>
<td>TOTAL (including international air transport)</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>TOTAL (excluding international air transport)</td>
<td>1.68</td>
<td>1.78</td>
</tr>
</tbody>
</table>

¹Air transport emissions are reported in units of MtCO₂.
²2050 is also the year of the UK CCA 2008 target
³The year with the highest annual emissions is interpreted as the ‘worst case’ referenced in para 5.77 of the ANPS. This year varies by scenario.
9.10.7 As set out in Section 9.9, the DCO Project without mitigation includes environmental measures that are part of the physical infrastructure of the draft masterplan. The DCO Project with mitigation scenario also includes further environmental measures which are not an inherent part of the proposed infrastructure, such as those associated with operational policies.

9.10.8 As described in Section 9.4, results for the DCO Project with mitigation scenario have only been quantified for surface access at this stage. Quantified results will be presented for all sub-aspects in the ES. These results will quantify the GHG emission reduction benefit of the full framework of embedded environmental measures.

9.10.9 Graphic 9.10 shows the preliminary results for surface access DCO Project with mitigation scenario which includes further operational environmental measures from the SAP.

9.10.10 These results show that the DCO Project with mitigation scenario for surface access leads to a reduction in emissions compared to the without mitigation scenario. Graphic 9.10 shows an increase in emissions coinciding with the first full year of third runway operations in 2027. If considered in aggregate over the
assessment period, emissions reduce from 33.57MtCO$_2$e (without mitigation) to 29.92MtCO$_2$e (with mitigation).

**Graphic 9.10: DCO Project with mitigation GHG emissions (surface access only)**

Quantification of effects by phase

9.10.11 Unlike other environmental aspects an assessment of the effects of the DCO Project disaggregated by phase is not considered relevant for GHG emissions. For GHG there is a less direct spatial and temporal link to the receptor than for other environmental topics. Also, as GHG results have already been quantified on an annual basis for every year in the assessment period, a further consideration of results by phase would not offer any additional insight. Therefore, a quantification of results by phase has not been presented.

9.11 Methodology for assessment of significance

Background to significance assessment of GHG emissions in EIA

9.11.1 There is currently no defined quantitative threshold of GHG emissions which, if exceeded, can be defined as significant. All GHG emissions are significant and contribute to climate change regardless of location or year, which aligns with the guidance by the Institute of Environmental Management and Assessment (IEMA,
2017). The IEMA guidance also considers the scale of emissions in terms of global climate change:

“Although the contribution of any single project’s emissions to climate change is infinitesimal, the combined GHG emissions from all human activity have been found to be significantly impacting global climate […] prudent planning dictates that all sectors address GHG emissions by identifying GHG sources and practicable means to reduce them.”

**Approach to assessing significance of the DCO Project**

9.11.2 The approach taken to determine significance considers the difference in GHG emissions (aggregated over the assessment period 2022 to 2050) between the future baseline and DCO Project without mitigation scenarios.

9.11.3 As set out in the Heathrow EIA Scoping Report (May 2018), the methodology assesses the difference in GHG emissions between the future baseline and the DCO Project without mitigation. For each scenario, total GHG emissions, and GHG emissions from separate sub-aspects (construction, air transport, surface access, and airport buildings and ground operations) have been calculated.

9.11.4 The difference in GHG emissions between the future baseline and the DCO Project without mitigation scenarios have been compared. However, the methodology for assessing whether the DCO Project without mitigation is significant is qualitative, using a similar approach and similar criteria as those taken by the Appraisal of Sustainability (AoS) published in support of the ANPS.

9.11.5 The AoS methodology has been adapted to meet the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The approach is also consistent with IEMA guidance. The criteria for assessment of significance are set out in Table 9.15.

**Table 9.15: Criteria for assessment of significance**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability that effect will occur based on available evidence</td>
<td>Very low (&lt;20%)&lt;br&gt;Low (20-40%)&lt;br&gt;Medium (40-80%)&lt;br&gt;High (&gt;80%)</td>
</tr>
<tr>
<td>Phase of effect</td>
<td>Single phase&lt;br&gt;Multiple phases</td>
</tr>
<tr>
<td>Frequency of effect (defined by number of occurrences, for example per annum)</td>
<td>Rare&lt;br&gt;Occasional&lt;br&gt;Intermittent&lt;br&gt;Continual</td>
</tr>
<tr>
<td>Duration of effect</td>
<td>Short-term: 0-5 years (for example construction period)</td>
</tr>
</tbody>
</table>
9.58 © Heathrow Airport Limited 2019

9.12 Preliminary assessment of significance

Overview

9.12.1 As required by the adopted methodology for assessing significance, the GHG emissions have been aggregated over the whole assessment period from 2022 to 2050, with this aggregated value reported for each scenario and broken down into sub-aspects. The estimated emissions aggregated over the whole assessment period are shown in Table 9.16.
### Table 9.16: GHG emission estimates aggregated over assessment period 2022-2050

<table>
<thead>
<tr>
<th>Scenario</th>
<th>GHG emissions aggregated over assessment period (MtCO₂e)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td>Future baseline¹</td>
<td>0.00</td>
</tr>
<tr>
<td>DCO Project without mitigation</td>
<td>3.70</td>
</tr>
<tr>
<td>Compared to future baseline</td>
<td>+3.70</td>
</tr>
<tr>
<td>DCO Project with mitigation</td>
<td></td>
</tr>
<tr>
<td>Compared to future baseline</td>
<td></td>
</tr>
<tr>
<td>Compared to DCO Project without mitigation</td>
<td></td>
</tr>
</tbody>
</table>

¹ No construction GHG emissions are included in the future baseline as all currently consented development is scheduled for completion before 2022.

**9.12.2** The assessment of emissions aggregated from 2022 to 2050 shows that when international air transport emissions are included, the DCO Project without mitigation scenario results in an additional 184.03 MtCO₂e compared to the future baseline scenario, a 38% increase.

**9.12.3** The assessment of emissions aggregated over the assessment period shows that when international air transport emissions are excluded the DCO Project without mitigation scenario results in an additional 12.68 MtCO₂e compared to the future baseline scenario, a 39% increase.
9.12.4 **Table 9.17** sets out how the DCO Project has been rated against the criteria used to qualitatively assess significance.

### Table 9.17: Significance rating for the DCO Project

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Significance Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability that effect will occur based on available evidence</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>There is no doubt that the DCO Project will result in GHG emissions</td>
</tr>
<tr>
<td>Phase of effect</td>
<td>Multiple phases</td>
</tr>
<tr>
<td></td>
<td>GHG emissions will be generated through construction and operational activities through all three development phases</td>
</tr>
<tr>
<td>Frequency of effect (defined by number of occurrences, for example per annum)</td>
<td>Continual</td>
</tr>
<tr>
<td></td>
<td>GHG emissions will be generated on an ongoing, continual basis.</td>
</tr>
<tr>
<td>Duration of effect</td>
<td>Long-term</td>
</tr>
<tr>
<td></td>
<td>GHG emissions will be generated for a period exceeding the assessment period.</td>
</tr>
<tr>
<td>Permanence of effect</td>
<td>Permanent</td>
</tr>
<tr>
<td></td>
<td>The DCO Project will be a permanent development and is not expected to be removed. The effects from the operation of the DCO Project are therefore also considered permanent. Effects from construction will be temporary.</td>
</tr>
<tr>
<td>Reversibility of effect</td>
<td>Irreversible</td>
</tr>
<tr>
<td></td>
<td>These effects could be reversed, for example by cessation of operations and removal of infrastructure, however this is not expected</td>
</tr>
<tr>
<td>Magnitude of effect</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>The magnitude of GHG emissions from the DCO Project are large enough to be noticeable on a national scale.</td>
</tr>
<tr>
<td>Spatial extent of effect</td>
<td>Effects extending beyond the UK</td>
</tr>
<tr>
<td></td>
<td>The receptor is the global atmosphere.</td>
</tr>
</tbody>
</table>

9.12.5 As can be seen in **Table 9.17**, the GHG emissions from the DCO Project are characterised as high probability; with long or continuous duration, permanent but potentially reversible and international in extent, with high magnitude. The combined nature of these effects has led to the conclusion that the DCO Project should be considered to result in a **Significant Negative** effect. This is in line with the conclusion reached in the AoS.
As the DCO Project with mitigation scenario has only been assessed for surface access at this stage, a preliminary assessment of significance has not been made for the DCO Project with mitigation scenario. An assessment of significance for the DCO Project with mitigation scenario will be made in the ES. It is considered likely that the assessment of the DCO Project with mitigation scenario at ES will also result in a significant negative effect.

The inherent cumulative nature of GHG effects means that it is not necessary or meaningful to assign significance ratings to each sub-aspect, and therefore this assessment has not been made. It is noted that the results in Table 9.16 show that international air transport has a greater magnitude of effect compared to the other sub-aspects.

**Methodology for assessing impact on UK Government carbon reduction targets and carbon budgets**

**ANPS requirements**

Table 9.1, Table 9.2 and Appendix 2.1 set out the key policy and legislation that applies to GHG emissions.

The ANPS considered the implications of the CO₂ emissions from air transport from the North West Runway (NWR) option on the Government’s ability to meet its carbon obligations. The NWR option has similar characteristics and capacity to that of the DCO Project assessed in this chapter.

Specifically, the ANPS took into account assessments carried out by the Airports Commission, subsequently updated through supplementary analysis completed by the DfT (DfT, 2017 and Ricardo, 2017). Paragraph 3.69 of the ANPS states that:

“The Government has considered this further analysis and concludes both that expansion via a Northwest Runway at Heathrow Airport (as its preferred scheme) can be delivered within the UK’s carbon obligations, and that the scheme is the right choice on economic and strategic grounds regardless of the future regime to deal with emissions from international aviation.”

The ANPS therefore concludes that the capacity provided by its preferred scheme, the NWR option, can be delivered within the UK’s carbon obligations. This provides a broad context against which to assess the compatibility of the DCO Project with UK carbon reduction obligations.

As set out in Section 9.12, the preliminary assessment has concluded that the DCO Project will have a significant negative effect on GHG emissions.

This finding is in line with the AoS of the ANPS, which concluded that Heathrow NWR scheme will result in a ‘significant negative effect’. It also concluded that the
NWR scheme, “could still be delivered consistent with the UK’s carbon commitments” (paragraph 9.12.15 of Appendix A-9).

Paragraph 5.82 of the ANPS also states that:

“Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets”.

The assessment of whether the estimated GHG emissions from the DCO Project materially affect the UK’s ability to meet its carbon reduction targets, including budgets, is therefore separate to the assessment of significance. Accordingly, Section 9.14 provides a preliminary assessment as to whether the DCO Project materially affects the ability of the Government to meet its carbon reduction targets, including the carbon budgets.

**Government carbon reduction targets**

*Climate Change Act requirements*

The CCA 2008 requires UK GHG emissions in 2050 to have reduced to at least 80% below 1990 levels. This legislation sets the framework for the UK’s climate change obligations. As noted in Table 9.3 the CCC has recently recommended that the UK should adopt a net zero target by 2050, however, this recommendation has not been translated into government policy at the time of this assessment. The assessment and definition of the requirements of the CCA are therefore presented here as currently legislated.

To date, five carbon budgets have been legislated, the latest being the ‘fifth’ carbon budget. Each carbon budget sets a limit on UK emissions for a five-year period. The carbon budgets set the required reduction in emissions and, in doing so, set the trajectory the UK should adopt to meet the requirements of the CCA 2008. As the sixth carbon budget is yet to be legislated, there are no carbon budgets covering the period from 2033 onwards. However, the 2050 target can be used to interpolate a trajectory. The CCC assesses the UK’s annual emissions to have been 837MtCO₂e in 1990 and therefore the 2050 target to be 167MtCO₂e, based on an 80% reduction against the 1990 value.

The CCC has also advised that the 2050 target should include an allowance, or headroom, for international aviation and shipping equal to approximately 41MtCO₂e in 2050 (CCC, 2015a). The Government’s Clean Growth Strategy (BEIS, 2018a) acknowledges this advice and confirms that although Government has not reached a final view on the appropriate level of international aviation and
shipping emissions in 2050, it has adopted the CCC’s advice to “leave space” in the 2050 target of around 41MtCO\textsubscript{2}e in developing its long term strategy.

9.13.12 Therefore, to be consistent with the approach taken by the Government’s Clean Growth Strategy, the 2050 carbon target allowing for headroom for emissions from international aviation and shipping is assumed to be 126MtCO\textsubscript{2}e in this PEIR.

9.13.13 The carbon budgets are set out in Table 9.18. The annual average for each budget period has been plotted on Graphic 9.11, which has also projected forward to the 2050 target.

Table 9.18: The UK carbon budgets and the CCA 2008 carbon target

<table>
<thead>
<tr>
<th></th>
<th>Year 1 2008–12</th>
<th>Year 2 2013–17</th>
<th>Year 3 2018–22</th>
<th>Year 4 2023–27</th>
<th>Year 5 2028–32</th>
<th>Year 6+ 2033–50</th>
<th>CCA 2050 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative emissions</td>
<td>3,018</td>
<td>2,782</td>
<td>2,544</td>
<td>1,950</td>
<td>1,725\textsuperscript{25}</td>
<td>Not yet legislated</td>
<td></td>
</tr>
<tr>
<td>in budget period</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual average</td>
<td>604</td>
<td>556</td>
<td>509</td>
<td>390</td>
<td>345</td>
<td>-</td>
<td>126\textsuperscript{26}</td>
</tr>
<tr>
<td>for budget period</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td>(MtCO\textsubscript{2}e)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{25} Based on the latest accounting basis and excludes GHG emissions from international aviation and shipping (IAS).

\textsuperscript{26} CCA 2008 target allowing for headroom of 41MtCO\textsubscript{2}e for international shipping and aviation.
To contextualise the DCO Project’s GHG emissions, all emissions except international air transport have been compared to the UK carbon target trajectory to 2050.

In addition, as set out in the Heathrow EIA Scoping Report (May 2018), sector specific comparisons have been made where possible.

### 9.14 Preliminary assessment of effect on Government carbon reduction targets and carbon budgets

**Overview (excluding international air transport)**

- **9.14.1** As shown in Graphic 9.11, the UK carbon target trajectory reduces over the period of the assessment towards the CCA 2050 target. As set out in Section 9.11, the CCA target and carbon budgets do not include international air transport.

- **9.14.2** As shown in Graphic 9.8, when emissions from international aviation are excluded for the DCO Project without mitigation overall emissions scenario peak during the construction period at around 1.87MtCO₂e in 2023 and then stabilise and begin to reduce during the mid-2030s, decreasing to 1.51MtCO₂e in 2050.
Although the calculated DCO Project GHG emissions decrease towards 2050, they decrease at a slower rate than assumed by the UK carbon target. The DCO Project without mitigation emissions in 2050 have been calculated to be equivalent to 1.20% of the CCA 2008 carbon target, compared to 0.85% for the future baseline scenario (refer to Table 9.19).

An increase in the relative contribution of Heathrow to UK GHG emissions is expected in the periods covered by the fourth and fifth carbon budgets. Heathrow emissions in the DCO Project without mitigation scenario are calculated to increase from 0.30% to 0.44% of the total UK carbon budget in the period between 2023 and 2027, and from 0.33% to 0.43% in the period between 2028 and 2032.

Therefore even in the DCO Project without mitigation scenario an increase of this scale is not considered to be “so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets”, which is the requirement outlined in Paragraph 5.82 of the ANPS.

Table 9.19: UK Government carbon targets and DCO Project GHG emissions

<table>
<thead>
<tr>
<th>Government budget / target</th>
<th>Reporting period</th>
<th>Whole UK</th>
<th>Heathrow GHG emissions excluding international air transport</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Future baseline</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total GHG in period (MtCO₂e)</td>
</tr>
<tr>
<td>4th carbon budget</td>
<td>2023 to 2027</td>
<td>1,950</td>
<td>5.93 0.30%</td>
</tr>
<tr>
<td>5th carbon budget</td>
<td>2028 to 2032</td>
<td>1,725</td>
<td>5.77 0.33%</td>
</tr>
<tr>
<td>CCA 2008 target (with headroom allowance for international aviation and shipping)</td>
<td>2050</td>
<td>126</td>
<td>1.07 0.85%</td>
</tr>
</tbody>
</table>

As the DCO Project design progresses and environmental measures are proposed by Heathrow, the DCO Project’s contribution during peak construction years and towards 2050 is likely to be further reduced. The calculated emissions for the DCO
Project with mitigation scenario will be presented in the ES and compared to carbon targets and budgets.

**Sector specific considerations**

9.14.7 As was set out in the Heathrow EIA Scoping Report (May 2018), this preliminary assessment has also considered the four sub-aspects separately in relation to UK carbon targets.

**Air transport**

9.14.8 In terms of air transport emissions, the policy position is summarised as follows:

1. International air transport emissions are currently excluded from the UK carbon budgets. Government policy seeks to manage these emissions through international agreements, such as the recent ICAO agreement to stabilise net global international emissions from 2020 through the CORSIA agreement.

2. The Government will consider further the advice from the CCC on the treatment of international aviation as part of its consultation on the DfT’s Aviation 2050 strategy.

3. Domestic aviation is included within the UK’s carbon budgets.

9.14.9 Therefore, international air transport has been excluded from the carbon target considerations shown in Table 9.19, while domestic air transport emissions have been aggregated with construction, surface access, and airport buildings and ground operations emissions for contextualising against Government carbon targets and budgets.

9.14.10 In addition, emissions from domestic air transport have been considered separately in the context of UK domestic air transport emissions.

9.14.11 In the absence of an agreed domestic aviation carbon budget, this preliminary assessment has examined consistency of domestic aviation emissions from Heathrow against the most up-to-date Government reported domestic emission forecast assuming the incorporation of the NWR scheme, as detailed in Table 9.20. Although the DCO Project differs from the NWR scheme, the rationale for making this comparison is that the emission forecasts reported in Table 9.20 formed part of the analysis that led to the government concluding that the NWR scheme was consistent with its carbon obligations.
Table 9.20: Total UK domestic departing aircraft emissions with NWR (MtCO₂)

<table>
<thead>
<tr>
<th>Year</th>
<th>Low</th>
<th>Central</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>1.51</td>
<td>1.51</td>
<td>1.51</td>
</tr>
<tr>
<td>2020</td>
<td>1.53</td>
<td>1.56</td>
<td>1.62</td>
</tr>
<tr>
<td>2030</td>
<td>1.79</td>
<td>1.84</td>
<td>1.88</td>
</tr>
<tr>
<td>2040</td>
<td>1.66</td>
<td>1.73</td>
<td>1.78</td>
</tr>
<tr>
<td>2050</td>
<td>1.63</td>
<td>1.76</td>
<td>1.83</td>
</tr>
</tbody>
</table>

Source: Table 37, DfT Aviation Forecasts 2017.
Low, Central and High refer to passenger growth scenarios based on macro-economic assumptions which are described in Table 21, DfT Aviation Forecasts 2017.

9.14.12 Domestic aviation CO₂ emissions from Heathrow were 0.165 MtCO₂ in 2017, the current baseline. The Department for Business, Energy and Industrial Strategy (BEIS) publishes GHG emissions data for the UK on an annual basis. The latest report (BEIS, 2019) shows that CO₂ emissions from UK domestic aviation were 1.53 MtCO₂ in 2017. This means that Heathrow domestic aviation emissions were approximately 11% of national domestic emissions in 2017, the current baseline year.

9.14.13 Table 9.21 presents a comparison of the DCO Project without mitigation domestic air transport CO₂ emissions relative to the DfT projections of total national domestic air transport CO₂ emissions. This comparison shows that the calculated percentage contribution of the DCO Project without mitigation to UK CO₂ emissions from domestic aviation increases to 12% in 2030 before falling to 10% in 2050, which is lower than in 2017.

Table 9.21: Comparison of CO₂ emissions from domestic air transport

<table>
<thead>
<tr>
<th>Year</th>
<th>UK CO₂ emissions from domestic air transport (DfT projections including NWR) (MtCO₂)</th>
<th>DCO Project without mitigation, CO₂ emissions from domestic air transport (MtCO₂)</th>
<th>(% of UK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>1.840</td>
<td>0.223</td>
<td>12%</td>
</tr>
<tr>
<td>2040</td>
<td>1.730</td>
<td>0.198</td>
<td>11%</td>
</tr>
<tr>
<td>2050</td>
<td>1.760</td>
<td>0.177</td>
<td>10%</td>
</tr>
</tbody>
</table>
The quantification in this preliminary assessment also estimates that CO₂ emissions from international air transport from the DCO Project without mitigation to be around 19.73MtCO₂ in 2050. This compares to 19.92MtCO₂ in the 2017 baseline.

Furthermore, the DfT analysis that resulted in the ANPS concluding that the NWR scheme “can be delivered within the UK’s carbon obligations” assumed 20.3MtCO₂ in 2050 from international and domestic air transport from Heathrow with the NWR scheme (DfT Air Traffic Forecast, 2017, Table 39). This compares to 19.90MtCO₂ for the DCO Project without mitigation (see Table 9.14).

Taken together this preliminary assessment therefore shows that:

1. Domestic aviation CO₂ emissions from the DCO Project without mitigation would not increase Heathrow’s share of future UK domestic aviation in 2050
2. International aviation CO₂ emissions from the DCO Project without mitigation in 2050 are calculated to be lower than those in 2017 and therefore will constitute a smaller percentage of the headroom allowance in future carbon budgets
3. Total calculated air transport CO₂ emissions from the DCO Project without mitigation in 2050 are lower than those assumed by the ANPS.

It therefore follows that the CO₂ emissions from air transport from the DCO Project are not considered to have a material impact on the ability of the UK to meet its carbon reduction targets and budgets.

The Aviation 2050 strategy also states that the Government wishes to adopt the CCC’s recommendation to limit CO₂ emissions from UK aviation to 37.5MtCO₂ by 2050. Heathrow’s percentage of this target has been calculated to decrease from 53.6% in 2017 to 53.1% in 2050 in the DCO Project without mitigation scenario. The emissions from the DCO Project with mitigation scenario, which will be assessed at ES stage, are anticipated to be lower.

Construction

Although emissions within each of the carbon budgets are aggregated by UK sector (for example agriculture, domestic transport or grid electricity) there is no construction sector-specific carbon budget. Instead, the DCO Project without mitigation is contextualised against the Low Carbon Routemap prepared by The Green Construction Board (GCB) (March 2013).

The GCB is a consultative forum for the UK Government and the built environment which aims to ensure sustainable growth within the construction industry. The GCB’s Routemap provides targets and recommendations to achieve an 80% reduction in GHG emissions in the built environment by 2050.
The GCB’s Routemap developed three GHG emissions trajectories to 2050 for the UK built environment: ‘business as usual’, ‘central scenario’ and ‘80% carbon reduction scenario’. The 80% carbon reduction scenario closely aligns with both the CCA 2008 target for 2050 and the UK carbon budgets. Its scope includes construction GHG emissions (referred to as ‘capital carbon’ within the GCB Routemap) from domestic buildings, non-domestic buildings and infrastructure.

Table 9.22 presents both the GCB’s 80% carbon reduction trajectory allocated within the five-yearly UK carbon budget periods, which overlap with the PEIR assessment period.

<table>
<thead>
<tr>
<th>Annual construction GHG emissions (MtCO₂e) in line with the five-yearly UK carbon budget periods</th>
<th>3 2018 – 22</th>
<th>4 2023 – 27</th>
<th>5 2028 – 32</th>
<th>6+ 2033 – 50</th>
<th>2050 Annual target</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCB 80% reduction trajectory</td>
<td>168.26</td>
<td>140.17</td>
<td>122.22</td>
<td>316.09</td>
<td>12.49</td>
</tr>
</tbody>
</table>

Annual construction GHG emissions from the DCO Project without mitigation vary with the construction programme, therefore it is not meaningful to compare them against a long-term sector-based trajectory. During peak construction years (from 2023 to 2027), when the majority of the main infrastructure is being built, the DCO Project could account for as much as 1.6% of UK-wide annual construction emissions. In the latter years (2028 to 2050) of the construction programme, the intensity of work decreases, as does the DCO Project’s contribution to the UK’s overall construction GHG emissions. By 2050, the CCA target year, construction emissions from the DCO Project will account for approximately 0.04% of UK construction emissions, and are unlikely to hinder the UK’s ability to meet its climate change obligations specifically relating to construction emissions.

Surface access

It is noted that the Business Case and Sustainability Assessment for Heathrow (Airports Commissions, July 2015) found that emissions for passenger access to Heathrow would increase to 2050. This increase was however justified when compared to the allocation of passenger transport to all airports in the UK:

“The combined total for all airports (e.g. including Gatwick, Stansted etc.) under the Heathrow Airport Northwest Runway scheme actually produces a decrease in total surface access emissions (-12.4% to baseline in 2050). This is due to the fact […] Heathrow has a higher public transport modal share than many other airports; passengers substituting into
The UK carbon budgets do not allocate the maximum permitted emissions for individual sectors such as transport or agriculture. When assessing a target for GHG emissions reductions, this makes it difficult to calculate the appropriate levels of reduction given the varying opportunities and costs associated with emissions reductions between sectors. While the published central projections (BEIS Projections 2017) do indicate a future decline in transport emissions (15% from 2016 levels by 2035), these projections use known policy and are not anticipated to result in reductions in line with the overall UK carbon target trajectory.

Total UK GHG emissions were 794MtCO$_2$e in 1990 and 456MtCO$_2$e in 2017, (BEIS, 2018). Over this period UK transport sector emissions have reduced slightly (by 0.7%), but this is at a slower rate than decarbonisation of the UK economy (43%). Therefore, as a percentage of UK emissions, the transport sector has increased from 16% of UK GHG emissions in 1990 to 27% in 2017. This highlights that different sectors and different parts of the economy do not decarbonise at the same rate.

In the absence of a UK surface transport carbon reduction target, no comparison with DCO Project surface access GHG emissions has been made.

Airport buildings and ground operations

Heathrow operational emissions are a result of energy and water use, and waste treatment. These compare with the UK carbon budget categories of waste, transport, buildings, industry and power. The aggregate budget allocations for these categories, which follow a trajectory in line with that in Table 9.18, have been used for the purposes of comparison with the DCO Project.

Over the assessment period to 2050 emissions from airport buildings and ground operations in the DCO Project without mitigation scenario range from 0.03% of the annual UK carbon budget for these sectors in 2025 up to a maximum of 0.07% in 2050. The scale of this contribution in any of the assessment scenarios is therefore determined not to be material to the ability of the Government to meet its carbon reduction targets.

9.15 Assessment of cumulative effects

Overview

In the EIA Scoping Report, it was proposed to align the GHG emissions cumulative effects assessment with the approach presented in Section 4.6
(Cumulative Effects Assessment) of the Scoping Report. However, this approach has been refined as the assessment methodology for GHG emissions is essentially cumulative in nature.

9.15.2 The GHG preliminary assessment, amongst other things, has considered whether the DCO Project materially impacts the UK’s ability to meet its carbon reduction targets and carbon budgets by 2050. The impact of the DCO Project on UK national projected GHG emissions has been considered. The preliminary assessment can be regarded as a cumulative assessment as the national projected GHG emissions take into account trends such as future development, technology and population changes which will have a bearing on national projections. Therefore, a separate cumulative effects assessment of GHG emissions has not been undertaken as part of this PEIR and will not be undertaken in the ES.

9.15.3 In accordance with IEMA, all GHG emissions are considered significant and contribute to climate change. The receptor for the climate change topic is the global atmosphere. Its relative carrying capacity for GHG emissions is large. It is considered that no single UK project in isolation, or on a cumulative national basis, would have any material impact on global warming. The preliminary assessment has shown that the DCO Project GHG emissions are not considered to have a material impact on the UK Governments ability to meet its GHG emission budgets to 2050. The GHG emissions from any neighbouring projects will not be of sufficient scale to result in any differentiating effect on the receptor. As such, it is concluded that there is no benefit in undertaking a cumulative GHG emissions assessment.

9.16 Consideration of additional environmental measures or compensation

Overview

9.16.1 The preliminary assessment presented in this PEIR has considered the change in gross emissions from the DCO Project. However, as indicated in Section 9.2 there are also international policies that seek to limit the aviation sector’s net international emissions that provide important context. The quantification in this PEIR has shown that international air transport is by far the largest component of emissions from the DCO Project.

9.16.2 The most important policy is CORSIA, which is currently scheduled to begin a pilot phase in 2021, a voluntary phase in 2024 and full implementation from 2027 to 2035. CORSIA aims to stabilise net emissions from international aviation at 2020 levels. International aviation policy beyond 2035 is not yet determined, however,
the international aviation sector represented through IATA has a commitment to reduce international aviation’s net emissions to 50% below those in 2005 by 2050.

9.16.3 Alongside these international policy commitments Heathrow has a long-term aspiration to make growth from the new runway carbon neutral.

9.16.4 Heathrow’s carbon neutral growth aspiration means that growth in CO₂ emissions from additional flights after expansion would be offset through carbon credits, resulting in no net growth in emissions. This aspiration also applies to GHG emissions from ground transportation for passengers and colleagues and the embodied carbon that would result from construction of the DCO Project.

9.16.5 Much of the growth in CO₂ emissions from the DCO Project would be offset by airlines as part of their obligations under CORSIA. However, since CORSIA applies only to international flights and a small number of destinations are exempt, for example flights to small island states and some of the world’s least developed countries, there is a small gap in emissions not covered by CORSIA.

9.16.6 To meet the aspiration for growth from the DCO Project to be carbon neutral, Heathrow wishes to close the gap for emissions not covered by CORSIA (Heathrow Carbon Neutral Roadmap 2018). To achieve this, Heathrow is engaging with airlines and governments to consider implementing measures such as voluntary agreements with carriers or financial incentives to drive sustainable operations.

9.16.7 In addition, Heathrow wishes to promote carbon market approaches that can support innovation and is developing best practice for offsetting in the UK. As an example of work in this area, Heathrow has funded a pilot peatland project to help offset a portion of the emissions from its own facilities, as well as helping to make the case for UK peatland offsets to be eligible for use in CORSIA. In collaboration with non-governmental organisations, the government and other sectors, this work is also exploring how Heathrow can support the development of a UK market for the ecosystem services that peatland and other habitats can provide. This aims to enable the different benefits such as carbon, biodiversity and water quality to be combined in a way that lowers the cost of environmental improvements, helps scale up investment in these measures, and increases the rate of their implementation.

9.16.8 Heathrow is also a founding member of Sustainable Aviation, the UK pan-industry group committed to the sustainable growth of aviation. Sustainable Aviation are due to publish a Decarbonisation Roadmap before the end of 2019, which will set

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27 As explained in Section 9.4, current DfT policy (DfT, 2017 and DfT, 2018) is to consider only CO₂ emissions from air transportation.
Heathrow has also made a commitment to operate zero carbon infrastructure, including buildings and other fixed assets by 2050. Heathrow has also committed to developing carbon offsetting as the final step in a hierarchy of measures for residual emissions from energy used in fixed infrastructure.

The environmental measures described in this section have not been assessed or quantified as part of the PEIR and will not be included in the DCO Project with mitigation scenario that will be assessed at ES stage. However, as indicated above they provide important context in the consideration of the effects of the DCO Project including those from the long term GHG impact of international aviation.

9.17 Next steps

Overview

9.17.1 Following this PEIR, as the EIA progresses to ES, a number of key activities will need to be undertaken in the carbon and GHG assessment.

9.17.2 The preliminary quantified GHG emissions assessment will be updated for the ES to take into account the latest available information. This includes the baseline assessment which uses the organisational carbon footprint that Heathrow updates and publishes on an annual basis. The current baseline in this PEIR assessment uses 2017 footprint data. The ES will present an updated current baseline to incorporate Heathrow’s 2018 footprint and carry through any relevant assumptions to the rest of the assessment.

9.17.3 As well as updating the baseline, other elements of the quantified assessment will be updated when further design information becomes available and in response to the Airport Expansion Consultation (June 2019).

9.17.4 For the ES, environmental measures will be developed in sufficient detail to allow the GHG reduction benefit to be assessed. The benefit of these measures will be quantified in the DCO Project with mitigation scenario which will be presented in the ES.

9.17.5 In terms of policy, it is noted that at this stage the Aviation 2050 strategy is out for consultation but has not been adopted, and the CCC’s Net Zero report which recommends a net zero UK carbon target inclusive of international aviation and shipping by 2050 has not been translated into changes to the CCA’s 2050 target.
and carbon budgets. Should policy become formalised during the development of the ES, these changes will be considered and reflected in the ES.

Engagement with key stakeholders, including with local authorities, CAA and CCC, will be ongoing as the assessment work progresses and the ES is developed. In particular, the advice to be given by the CCC to the DfT on international aviation emissions will be a key policy element.