

## 7. Climate

### 7.1 Introduction

- 7.1.1 This chapter of the Environmental Statement (ES) assesses the likely significant effects of the Proposed Scheme with respect to climate. The chapter should be read in conjunction with the development description provided in **Chapter 3: Description of the Proposed Scheme** and with respect to relevant parts of other chapters for air quality (**Chapter 6: Air quality**) and transport (**Chapter 10: Transport**), where there is an overlap or relationship between the assessment of effects. This chapter presents a new assessment to fulfil the requirements of the 2017 EIA Regulations.
- 7.1.2 This chapter assesses the impact of the increase in Greenhouse Gas (GHG) emissions as a result of the Proposed Scheme on the global climate. It aims to identify the extent to which the magnitude of emissions associated with the 'with development' case (representative of a 19 mppa airport) compared to 'without development' case (representative of 18 mppa) affects the ability to meet national budgets and targets for climate change.
- 7.1.3 The growth to 19 mppa will be accommodated without any new on-airport infrastructure, including that which is already permitted and not yet built, and that which could be built under permitted development rights. The growth to 19 mppa would, therefore, not require any operational development and hence, emissions from construction activities are not considered in this assessment.

### 7.2 Limitations of this assessment

- 7.2.1 The limitations relating to the climate assessment for GHG emissions that affect the robustness of the assessment of the likely significant effects of the Proposed Scheme are:
- Carbon dioxide (CO<sub>2</sub>) & carbon dioxide equivalent<sup>64</sup> (CO<sub>2</sub>e) emissions have been calculated for different sources based on convention. Aviation emissions are by convention reported as CO<sub>2</sub> emissions (see **Section 7.9**). This reflects the uncertainties associated with non-CO<sub>2</sub> effects. All other emissions sources are reported in CO<sub>2</sub>e. For aviation, since only CO<sub>2</sub> is reported with a global warming potential of one, 1 tonne of CO<sub>2</sub> is equal to 1 tonne of CO<sub>2</sub>e and hence no conversion is needed to sum together these emission sources.
  - There is significant uncertainty around aviation policy with regards to climate change. Latest guidance has been used to inform the assessment approach and a sensitivity assessment is presented for international aviation emissions that considers a hypothetical reduced UK 2050 international aviation budget, based on recommendations from the Committee on Climate Change (CCC). This represents best practice at the time of submission.

### 7.3 Relevant legislation, planning policy, technical guidance

#### Legislative context

- 7.3.1 The following legislation is relevant to the assessment of the effects on climate receptors:

---

<sup>64</sup> Carbon dioxide equivalent (CO<sub>2</sub>e) is a term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO<sub>2</sub>e represents the amount of CO<sub>2</sub> which would have the equivalent global warming impact.

- 7.3.2 The core legislation that is of relevance to this assessment is the Climate Change Act 2008<sup>65</sup>, as amended in 2019. The Act now commits the Secretary of State to ensure that the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline ('the UK carbon target'). The UK carbon target is now often referred to as 'net zero'. The Act also requires the Secretary of State to set successive five-year carbon budgets ('the UK carbon budgets') to meet the UK carbon target for 2050<sup>66</sup>.
- 7.3.3 International aviation is not part of the 'net UK carbon account' and so is not included in the UK carbon target or the UK carbon budgets, but the UK carbon budgets are to be set 'having regard to' international aviation. In practice, the successive carbon budgets have been set allowing for 'headroom' for what is sometimes referred to as the 'planning assumption' (also referred to as the 'aviation target'). The 'planning assumption' that has been allowed for in all carbon budgets to date is 37.5Mt CO<sub>2</sub>e<sup>66</sup>. Thus, the latest (i.e. Fifth) carbon budget for the period to 2028-2030 is set at 1,765 Mt CO<sub>2</sub>e (reflecting – that is excluding – a 'planning assumption' of 37.5Mt CO<sub>2</sub> for international aviation). This 'planning assumption' reflects the advice of the CCC in 'Meeting the UK aviation target – options for reducing emissions to 2050'<sup>67</sup>.
- 7.3.4 In 2019 the CCC recommended to the Department for Transport (DfT) that international aviation (and shipping) are brought into the Sixth UK carbon budget<sup>68</sup>. Recommendations from the CCC in setting the Sixth carbon budget were published on 09 December 2020<sup>69</sup>. The Government must set the Sixth carbon budget in law by the end of June 2021.
- 7.3.5 The UK is part of the European Union (EU) Emissions Trading Scheme (ETS)<sup>70</sup>, a cap-and-trade mechanism in which an allowance for annual carbon emissions from various sectors has been agreed at the EU level. The 2012 extension of EU ETS currently incorporates emissions from domestic aviation flights.
- 7.3.6 The Town and Country Planning (Environmental Impact Assessment) Regulations 2017<sup>71</sup> require the consideration of climate change.

## Planning policy context

- 7.3.7 A summary of the relevant planning policies is given in **Table 7.1**.

<sup>65</sup> The UK Government. (2008). Climate Change Act 2008. [online]. Available at: <http://www.legislation.gov.uk/ukpga/2008/27/contents> [Accessed 21 October 2020].

<sup>66</sup> The UK Government. (2016). Carbon Budgets. [online]. Available at: <https://www.gov.uk/guidance/carbon-budgets> [Accessed 21 October 2020].

<sup>67</sup> Committee on Climate Change. (2009). Meeting the UK aviation target – options for reducing emissions to 2050. [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2009/12/CCC-Meeting-the-UK-Aviation-target-2009.pdf> [Accessed 21 October 2020].

<sup>68</sup> Committee on Climate Change (2019), "Letter: International aviation and shipping and net zero", [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2019/09/Letter-from-Lord-Deben-to-Grant-Shapps-IAS.pdf> [Accessed 21 October 2020].

<sup>69</sup> Committee on Climate Change (2020), "The Sixth Carbon Budget: The UK's path to Net Zero". [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf> [Accessed 14 December 2020].

<sup>70</sup> European Parliament and the Council of the European Union. (2003). Establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (the EU Emissions Trading System). [online]. Available at: <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32003L0087&from=EN> [Accessed 21 October 2020].

<sup>71</sup> The UK Government (2017). The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 [online]. Available at: <https://www.legislation.gov.uk/uksi/2017/571/contents/made> [Accessed 4 November 2020].

Table 7.1 Planning policy issues relevant to climate

Reference	Policy issue
<b>International planning policies</b>	
The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement <sup>72</sup>	The UNFCCC is the major international body responsible for managing climate change and carbon emissions. In 2015, it adopted the Paris Agreement, the aims of which are stated as: <i>"This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change; and (b) Increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production"</i> . The agreement sets targets for countries' GHG emissions, but these are not legally binding or enforceable. The agreement excludes international aviation (but domestic aviation is included).
European Union (EU) Emissions Trading Scheme (ETS) <sup>70</sup> and emerging UK ETS <sup>73</sup>	The UK Government are developing a mechanism to replace the EU ETS when the transition period of exiting the EU ends, as set out in the policy paper <i>'The future of UK carbon pricing'</i> . The final policy, to enter force in 2021, is expected to reduce the existing emissions cap by 5% compared to the current EU system. The proposed aviation routes include UK domestic flights, flights between the UK and Gibraltar, flights from the UK to EEA states, and flights from the UK to Switzerland.
<b>National planning policies</b>	
Aviation Policy Framework (APF) (DfT, 2013) <sup>74</sup>	The APF presents the government's objective to <i>"ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions"</i> . This document postpones deciding on whether the UK should retain a national emissions target for aviation. It also sets out the need to better understand and manage the risks associated with climate change. This was deemed essential for the successful long-term resilience of the UK's aviation industry and its contribution to supporting economic growth and competitiveness.  The APF set out the need for a national policy statement (NPS) for the case of any new national hub airport capacity, the Aviation NPS <sup>75</sup> (ANPS) was published in June 2018. However, on 27 February 2020 the Court of Appeal ruled that the ANPS was not produced as the law requires. The Government is required to review the ANPS to ensure that full regard is taken for The Paris Agreement <sup>72</sup> and either withdraw, amend or leave the statement as it is. This review is ongoing.
National Planning Policy Framework <sup>76</sup> (NPPF)	The NPPF acts as guidance for local planning authorities and decision-makers, both for developing plans and making decisions about planning applications.  In Paragraph 148, the revised NPPF from 2019 states: <i>"The planning system should support the transition to a low carbon future in a changing climate... shape places in ways that contribute to radical reductions in greenhouse gas emissions... and support renewable and low carbon energy and associated infrastructure"</i> .  It also requires, in Paragraph 150, that new development should be planned for in ways that <i>"can help to reduce greenhouse gas emission, such as through its location, orientation and</i>

<sup>72</sup> UNFCCC. (2015). The Paris Agreement. [online]. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

<sup>73</sup> Welsh Government, The Scottish Government, Department of Agriculture, Environment and Rural Affairs (Northern Ireland), and Department for Business, Energy & Industrial Strategy. (2020). The future of UK carbon pricing. [online]. Available at: <https://www.gov.uk/government/consultations/the-future-of-uk-carbon-pricing> [Accessed 21 October 2020].

<sup>74</sup> Department for Transport (2013). Aviation Policy Framework. [online]. Available at: <https://www.gov.uk/government/publications/aviation-policy-framework>

<sup>75</sup> Department for Transport (2018). Aviation National Policy Statement. [online]. Available at: <https://www.gov.uk/government/publications/airports-national-policy-statement>

<sup>76</sup> Ministry of Housing, Communities and Local Government. (2019). National Planning Policy Framework (NPPF). [online]. Available at: <https://www.gov.uk/government/publications/national-planning-policy-framework--2#history> [Accessed 21 October 2020].

Reference	Policy issue
The Ten Point Plan for a Green Industrial Revolution <sup>77</sup>	<p><i>design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards".</i></p> <p>Furthermore, in Paragraph 153, it is stated that local planning authorities should expect new development to: "a) comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable; and b) take account of landform, layout, building orientation, massing and landscaping to minimise energy consumption."</p> <p>This plan sets out the UK Government's approach to "build back better" following the impacts of the COVID-19 pandemic in 2020. It includes details of how the government intend to accelerate the path to net zero in line with the commitment made in the Climate Change Act (amended)<sup>65</sup>. Included within the plan of relevance to this assessment is the accelerated shift to zero emission vehicles with a ban on sales of new petrol and diesel cars and vans from 2030, which is 10 years ahead of the previous target. The plan also includes commitments to take "steps to drive the uptake of sustainable aviation fuel, investment in R&amp;D to develop zero-emission aircraft and developing the infrastructure of the future at our airports". Consultation on the Aviation Decarbonisation Strategy is planned for 2021.</p>
<b>Development plan and local policies</b>	
Luton Local Plan (2011 – 2031) <sup>78</sup>	<p>Strategic objective 1 of the Plan includes supporting "sustainable growth over the Plan period based on [London Luton Airport's] strategic importance." No definition of sustainable growth is given in this objective but other non-airport specific policies within the Plan capture what is meant by sustainable growth. The following policies are of relevance to the Proposed Scheme:</p> <ul style="list-style-type: none"> <li>● Policy LLP6 – London Luton Airport Strategic Allocation B: "(ii) they contribute to achieving national aviation policies; ... (iv) they fully assess the impacts of any increases in Air Transport Movements on surrounding occupiers and/or local environment (in terms of noise, disturbance, air quality and climate change impacts), and identify appropriate forms of mitigation in the event significant adverse effects are identified; .... (viii) incorporate sustainable transportation and surface access measures that, in particular, minimise use of the private car, maximise the use of sustainable transport modes and seek to meet modal shift targets, all in accordance with the London Luton Airport Surface Access Strategy".</li> <li>● Policy LLP25 – High quality design (vii): Proposals must show specific design criteria including provisions to "reduce carbon emissions, risk of flooding, and increase energy and water efficiency and quality". While the Proposed Scheme does not require any new infrastructure to be designed, the principals of this policy will be followed.</li> <li>● Policy LLP37 – Climate change, carbon and waste reduction and sustainable energy: New developments are expected to "contribute towards mitigation, and adaptation to climate change through energy use reduction, efficiency, and renewable, and decentralised energy". While the Proposed Scheme does not require any new infrastructure to be designed, the principals of this policy will be followed.</li> </ul>

<sup>77</sup> Th UK Government (2020). The Ten Point Plan for a Green Industrial Revolution [online]. Available: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/936567/10\\_POINT\\_PLAN\\_BOOKLET.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/936567/10_POINT_PLAN_BOOKLET.pdf) [Accessed 20 November 2020].

<sup>78</sup> Luton Borough Council. (2017). Luton Local Plan (2011 – 2031). [online]. Available at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Local%20Plan/adoption/Luton-Local-Plan-2011-2031-November-2017.pdf>

## Local targets, budgets, and action plans

- 7.3.8 At a local level there are no binding GHG targets, although the Luton Borough Council Climate change action plan<sup>79</sup>, published in 2019, sets out a commitment that Luton Borough will aim “for net zero carbon in advance of the national target in 2050”. Luton Borough Council has an aim for the borough to be carbon neutral by 2040. This strategy does not specifically mention aviation although London Luton Airport (LLA) is described as partner in some of the targets.
- 7.3.9 The Action Plan<sup>79</sup> suggests that a 2040 carbon neutral target for the borough is reasonably achievable, although it is acknowledged that the plan “does not describe how the borough as a whole will reach carbon neutrality” and a carbon reduction plan to achieve carbon neutrality for the whole borough it is not yet set out. As a result, for the purposes of this assessment, the non-aviation GHG emissions from the expansion of LLA are considered within the context of a 2040 carbon neutral Luton Borough, with an acknowledgement that the policy landscape may evolve significantly.
- 7.3.10 Emerging policies from the action plan<sup>79</sup> relating to GHG emissions at LLA include:
- Investigate introducing a workplace parking levy to secure investment in sustainable transport;
  - Investigate setting up a council PV company to install willing private properties; and
  - Investigate creating a local community carbon offsetting mechanism to channel funds for local energy efficiency measures.
- 7.3.11 Since this plan, further progress has been made on measuring current emissions across Luton and expanding the commitment to be a ‘carbon neutral town’ by 2040. The climate change action plan and the Local Plan<sup>78</sup> will be reviewed in the near future. It will consider exacting environmental standards for new developments by setting parameters for zero carbon development and providing significant improvements in air quality in the borough. In January 2020, Luton Borough Council set out in an executive report that it will work with London Luton Airport Operations Limited (LLAOL) to work towards net zero carbon by 2040 and published a climate change report as an evidence base of current GHG emissions<sup>80</sup>.

## Technical and other policy guidance

- 7.3.12 **Table 7.2** lists guidance documents which are relevant to the climate assessment.

Table 7.2 Technical guidance relevant to climate

Guidance	Relevance
<b>Carbon Management Standards and Guidance</b>	
<i>The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard</i> (GHG Protocol) (WBCSD and WRI, 2014) <sup>81</sup>	Provides standards and guidance for preparing a GHG emissions inventory.

<sup>79</sup> Luton Borough Council, (2019). Climate change action plan: Becoming a carbon neutral borough by 2040. Available at: <https://www.luton.gov.uk/Environment/Lists/LutonDocuments/PDF/Climate%20change/Climate-change-action-plan.pdf> [Accessed 25 November 2020].

<sup>80</sup> Luton Borough Council/Anthesis (2020). Climate Action Plan Support. [online] Available at [https://www.anthesisgroup.com/wp-content/uploads/2020/03/Luton-Climate-Action-Plan-Support\\_FINAL\\_v2.pdf](https://www.anthesisgroup.com/wp-content/uploads/2020/03/Luton-Climate-Action-Plan-Support_FINAL_v2.pdf)

<sup>81</sup> World Business Council for Sustainable Development (WBCSD) and World Resources Institute (WRI) (2014). The Greenhouse Gas Protocol – A Corporate Accounting and Reporting Standard, March 2014, [online]. Available at: <http://www.ghgprotocol.org/sites/default/files/ghgp/standards/ghg-protocol-revised.pdf>

Guidance	Relevance
Publicly Available Standard (PAS) 2080: 2016 – <i>Carbon Management in Infrastructure</i> (BSI, 2016) <sup>82</sup>	Provides an approach to management of reduction of GHG emissions from infrastructure projects, working with stakeholders throughout the project lifecycle.
Institute of Environmental Management and Assessment (IEMA) <i>Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance</i> <sup>83</sup>	Current IEMA principles and guidance state that due to the combined environmental effect that is approaching a scientifically defined limit, any GHG emissions or reductions from a project might be considered to be significant. The IEMA guidance goes on to state that an Environmental Impact Assessment (EIA) should therefore ensure the project addresses their GHG emissions occurrence by taking mitigating action.
IEMA Principles Series: Climate Change Mitigation & EIA <sup>84</sup>	
BS EN ISO 14064-1 (BSI, 2019) <sup>85</sup>	ISO 14064-1 sets out guidance for quantification and reporting of greenhouse gas emissions and removals. The methodology for quantification of greenhouse gases follows this guidance and the stated guidance on reporting will be taken into account as part of this assessment.
<b>Policy strategies and guidance</b>	
<i>Clean Growth Strategy</i> <sup>86</sup>	<p>Provides the strategy for the UK's future clean growth to allow Carbon Budgets<sup>66</sup> to be met and support economic growth. The strategy sets out policies and targets out to 2050 for reducing GHG emissions across a number of sectors.</p> <p>The strategy focuses on accelerating clean growth, improving business and industry inefficiency, improving the energy efficiency of homes, rolling out low carbon heating, accelerating the shift to low carbon transport, delivering clean, smart, flexible power, enhancing the benefit and value of our natural resources and leading in the public sector and government.</p>
Committee on Climate Change, <i>Net Zero. The UK's contribution to stopping global warming, 2019</i> <sup>87</sup>	<p>The report responds to a request from the UK governments to provide updated advice on the UK's long-term emission target, including the possibility of setting a "net-zero" target, following recent Intergovernmental Panel on Climate Change (IPCC) reports<sup>88</sup>. The report suggests that the UK "should set and vigorously pursue an ambitious target to reduce greenhouse gas emissions (GHGs) to 'net-zero' by 2050".</p> <p>The report suggests strengthening aviation policies for both domestic and internationally agreed policies. The report also recognises the importance of Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)<sup>89</sup> (see below for further information) and highlights that it will need to be based on robust rules that deliver genuine emission reduction.</p> <p>The UK Government has heeded the CCC advice and amended the target in the Climate Change Act 2008 to achieve net-zero<sup>65</sup>. This target has therefore been adopted into UK Policy for domestic aviation and is considered in the climate assessment for London Luton Airport.</p>

<sup>82</sup> British Standards Institution (BSI). (2016). *PAS 2018:2016. Carbon management in infrastructure*.

<sup>83</sup> IEMA. (2017). *Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance*. [online]. Available at:

<https://www.iema.net/assets/newbuild/documents/IEMA%20GHG%20in%20EIA%20Guidance%20Document%20V4.pdf>

<sup>84</sup> IEMA (2010). *Climate Change Mitigation & EIA* [online]. Available at: <https://www.iema.net/document-download/33006> [Accessed 21 October 2020]

<sup>85</sup> British Standards Institute. (2019). *BS EN ISO 14064-1: 2019 Greenhouse gases. Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*.

<sup>86</sup> BEIS (2017). *Clean Growth Strategy*, [online]. Available at: <https://www.gov.uk/government/publications/clean-growth-strategy>

<sup>87</sup> Committee on Climate Change, (2019), "Net Zero: The UK's contribution to stopping global warming", [online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2019/05/Net-Zero-The-UKs-contribution-to-stopping-global-warming.pdf>

<sup>88</sup> IPCC (2018), "Special Report: Global Warming of 1.5°C", [online]. Available at <https://www.ipcc.ch/sr15/> [Accessed 21 October 2020].

<sup>89</sup> ICAO. (2016). *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*. [online]. Available at: <https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx> [Accessed 21 October 2020].

Guidance	Relevance
Decarbonising Transport: Setting the challenge <sup>90</sup>	The UK Government has begun the process of developing a plan to accelerate the decarbonisation of the transport sector. The Transport Decarbonisation Plan (TDP) is expected in Spring 2021. This initial document describes the challenges and potential policy proposals that will need to be developed to achieve a coordinated plan for decarbonising transport. It recognises airport expansion as a <i>"core part of boosting our global connectivity and levelling up across the UK"</i> . It stresses that <i>"action at an international level is the Government's preferred approach for addressing aviation's international carbon emissions"</i> . Further work is planned on developing the uptake of low carbon fuels in aviation. International aviation emissions from London Luton Airport will be considered against the planning assumption for aviation emissions as indicated by DfT in the Aviation 2050 Strategy <sup>91</sup> .
Committee on Climate Change: Reducing UK emissions 2020 Progress Report to Parliament <sup>93</sup>	This report sets out the UK's progress against emissions reduction targets to 2050. The Progress Report is updated annually. The report reiterates the previous recommendation that international aviation and shipping should be formally included in UK climate targets when the Sixth Carbon Budget is set (in December 2020).
Government's Response to the Committee on Climate Change's 2020 Progress Report to Parliament <sup>92</sup>	This document sets out the UK Government's response to the CCC's 2020 Progress Report <sup>93</sup> and sets out policy recommendations for departments. The Government announced that it will publish a consultation on net zero aviation and that it is committed to negotiating in International Civil Aviation Organization (ICAO) for a long-term emissions reduction goal for international aviation that is consistent with the temperature goals of the Paris Agreement <sup>72</sup> . The Government also stated that it would be minded to include international aviation and shipping in UK carbon budgets if there is insufficient progress at international level. The Government also stressed that <i>"Airport expansion is a core part of boosting our global connectivity and levelling up across the UK"</i> .
<b>The Sixth Carbon Budget: The UK's path to Net Zero<sup>69</sup></b>	The CCC's recommendations for the Sixth Carbon Budget represent a world-leading commitment that will place the UK on a path to Net Zero by 2050 at the latest, with a trajectory that is consistent with the Paris Agreement. The recommendations require a reduction in UK GHG emissions of 78% by 2035 relative to 1990 which represents early action towards the commitment needed by 2050. International aviation and shipping is included within the budget although it is accepted that the sector itself will not be net zero and will require GHG removals. The Government must set the Sixth Carbon Budget in law by the end of June 2021. The CCC suggest that this must be followed by a set of policies and proposals that demonstrably would meet the budget. Suggested policies and proposals are recommended within the report.
<b>Aviation GHGs guidance</b>	
International Civil Aviation Organization (ICAO) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) <sup>89</sup>	The ICAO is the delegated body for addressing requirements of the UNFCCC and the Paris Agreement <sup>72</sup> with regards to aviation. One hundred and ninety-one Member States agreed in 2016 to introduce a global market-based emissions offsetting scheme, known as CORSIA. The UK Government is a member of ICAO and signed up to CORSIA. The aim of CORSIA is to achieve carbon-neutral growth in aviation emissions from 2020 onwards. It relies on offsetting and emission reductions through the use of technological and operational improvements, and sustainable aviation fuels. CORSIA will be implemented in three phases: a pilot phase (from 2021 to 2023), the first phase (2024 to 2026) and the second phase (2027 to 2035). The pilot and first phase are voluntary whereas the second phase applies to all ICAO Member States. By 2035 90% of international aviation activity will come under the scheme.

<sup>90</sup> Department for Transport (2020). Decarbonising Transport: Setting the Challenge. [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/876251/decarbonising-transport-setting-the-challenge.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/876251/decarbonising-transport-setting-the-challenge.pdf)

<sup>91</sup> The UK Government. (2018). Aviation 2050: The future of UK aviation. A consultation. [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/769695/aviation-2050-web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/769695/aviation-2050-web.pdf) [Accessed 21 October 2020].

<sup>92</sup> The UK Government, (2020), Government response to the Committee on Climate Change 2020 progress report to Parliament: reducing UK emissions. [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/928005/government-response-to-ccc-progress-report-2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/928005/government-response-to-ccc-progress-report-2020.pdf) [Accessed 17 November 2020].

<sup>93</sup> Committee on Climate Change. (2020). Reducing UK emissions: 2020 Progress Report to Parliament, [online]. Available at: <https://www.theccc.org.uk/publication/reducing-uk-emissions-2020-progress-report-to-parliament/> [Accessed 21 October 2020].

Guidance	Relevance
	<p>CORSIA is based on comparing the total CO<sub>2</sub> emissions for a year (from 2021 onwards) against a baseline level of CO<sub>2</sub> emissions, which was originally defined as the average of CO<sub>2</sub> emissions from international aviation covered by the CORSIA for the years 2019 and 2020. Considering the impact of COVID-19 on the aviation sector, the Council agreed that 2019 emissions shall be used for 2020 emissions in the pilot phase<sup>94</sup>.</p> <p>All operators with annual emissions greater than 10,000 tonnes of CO<sub>2</sub> are required to report their emissions on an annual basis, with monitoring starting from 1 January 2019 (international flights only). Offsetting requirements will apply from 2021. London Luton Airport is committed to the implementation of CORSIA to stabilise net carbon emissions from flights.</p>
<p>UK Aviation Forecasts (2017)<sup>95</sup></p>	<p>The DfT's UK Aviation Forecasts includes a capacity of 18 mppa for London Luton Airport but recognises that this will be reached in the near future. In Paragraph 7.24 it states that "Luton is expected to reach its 18mppa planning cap soon after 2020, so the relief from congestion after extra capacity is provided around 2017 is short-lived". London Luton Airport CO<sub>2</sub> emissions are stated as a baseline (2016) of 1.0 MtCO<sub>2</sub> although the DfT forecasts this to decrease to a maximum of 0.7 MtCO<sub>2</sub> in the 2050s.</p>
<p>The European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) Guidebook<sup>96</sup></p>	<p>The Guidebook provides guidance and data for the calculation of aviation emissions over the cruise and Landing and Take Off (LTO) phases. The EEA and the United Nations' Long-Range Transboundary Air Pollution (LRTAP) project produce the guidebook to support the compilation of greenhouse gas inventories across Europe and across market sectors. The aviation chapter of the guidebook recommends methodologies for calculating CO<sub>2</sub> emissions from aviation, with various 'tiers' or levels of accuracy. The Tier 3A approach shall be used by the assessment since it provides the highest level of accuracy and is consistent with the forecast data available for the development.</p>
<p>London Luton Airport Vision for Sustainable Growth 2020-2050<sup>97</sup></p>	<p>This report is produced by London Luton Airport Ltd (LLAL), the landowners of London Luton airport. They recognise that London Luton Airport "has a significant influence over factors that contribute to it, such as: emissions from aircraft; vehicle trips; and those associated with the activities of other companies operating at the airport." It commits LLAL to developing a comprehensive strategy to reduce carbon emissions where possible prior to future expansion work.</p>
<p>Aviation 2050: The Future of UK Aviation<sup>91</sup></p>	<p>The Aviation 2050 strategy was under consultation from December 2018 to June 2019. It was published prior to the CCC's Net Zero recommendation<sup>87</sup> and the subsequent update to the Climate Change Act<sup>65</sup>. While the response from the Government is expected imminently, it does not yet represent adopted policy. Nevertheless, the consultation documents state the government's intention to "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 [37.5 MtCO<sub>2</sub>]." Such consideration has therefore been applied to the climate assessment of the Proposed Scheme at London Luton Airport.</p> <p>Since the development of the Aviation Strategy, the consultation document "the future of UK aviation: making best use of existing runways"<sup>98</sup> has been produced which sets out how UK</p>

<sup>94</sup> ICAO. (2020). CORSIA and COVID-19. [online]. Available at: <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx> [Accessed 21 October 2020].

<sup>95</sup> Department for Transport (2017). UK aviation forecasts, [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/781281/uk-aviation-forecasts-2017.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/781281/uk-aviation-forecasts-2017.pdf)

<sup>96</sup> European Environment Agency (2017). Emission Factor Database and EMEP/EEA air pollutant emission inventory guidebook – 2016, [online]. Available at: <https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/emission-factors-database>

<sup>97</sup> London Luton Airport Ltd., (2017), "London Luton Airport Vision for Sustainable Growth 2020-2050", [online]. Available at [https://www.luton.gov.uk/Council government and democracy/Lists/LutonDocuments/PDF/CPC/19-London-Luton-Airport-Vision-for-sustainable-growth-2020-50.pdf](https://www.luton.gov.uk/Council%20government%20and%20democracy/Lists/LutonDocuments/PDF/CPC/19-London-Luton-Airport-Vision-for-sustainable-growth-2020-50.pdf)

<sup>98</sup> HM Government (2018). Beyond the horizon: The future of UK aviation. Making best use of existing runways. [online]. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/714069/making-best-use-of-existing-runways.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf) [Accessed 21 October 2020].

Guidance	Relevance
	<p>carbon budgets can be met whilst increasing passenger numbers at airports other than Heathrow (based on the 37.5 MtCO<sub>2</sub> recommended target).</p> <p>The Aviation Strategy will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020<sup>92</sup>.</p>
<p>Committee on Climate Change Letter on International aviation and shipping and net zero<sup>68</sup></p>	<p>This 2019 letter responds to the Government's request for advice on bringing international aviation and shipping (IAS) emissions formally within the net-zero target. For international aviation, the CCC advice a primary policy approach of international framing while still setting domestic targets. It is recognised that "Zero-carbon aviation is highly unlikely to be feasible by 2050" yet reduced emissions are suggested through "a combination of fuel efficiency improvements, limited use of sustainable biofuels, and by managing demand growth". It is acknowledged that the use of GHG removal offsets (e.g. CORSIA) will be essential for reducing emissions in the IAS sectors. The letter sets a target for aviation emissions in 2050 of 30 MtCO<sub>2</sub> although this is assumed to be superseded by the CCC's recommendation in the Sixth Carbon Budget report<sup>69</sup>.</p> <p>IAS emissions have not legally been brought within the UK carbon budgets, however international aviation emission from London Luton Airport are contextualised in the climate assessment.</p>
<p>Sustainable Aviation Carbon Road-Map: A path to Net Zero<sup>99</sup></p>	<p>Sustainable Aviation is a group of UK airlines, airports, aerospace manufacturers and air navigation service providers which aim to set out a collective and long-term strategy to ensure a sustainable future for UK aviation. In 2020, the group published Sustainable Aviation Carbon Road-Map: A path to Net Zero. This report sets out how the UK "can accommodate a 70% growth in passengers by 2050 whilst reducing net carbon emissions levels from just over 30 million tonnes of CO<sub>2</sub> year down to zero through smarter flight operations, new aircraft and engine technology, modernising our airspace, the use of sustainable aviation fuels and significant investment in carbon reductions through smart market-based policy measures". London Luton Airport is aligned to the goals of Sustainable Aviation and actively involved in achieving the road-map.</p>
<b>International scientific reports</b>	
<p>Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5): Synthesis Report<sup>100</sup></p>	<p>The Fifth Assessment Report (AR5) from the IPCC was published in 2014 and provides robust evidence that "human influence on the climate system is clear". It stresses the long-term risk associated with future increases in greenhouse gas emissions that "will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems". The IPCC report underpins the international response in terms of international agreements and carbon budgets as "substantial emissions reductions over the next few decades can reduce climate risks in the 21st century and beyond". These factors are used to contextualise the GHG emissions created by the Proposed Scheme. The sixth report (AR6) is expected in June 2022.</p>
<p>Intergovernmental Panel on Climate Change (IPCC) Special Report (SR15): Synthesis Report, 2018<sup>88</sup></p>	<p>In 2018, the IPCC released a special report on the climate change impacts of a temperature increase of 1.5°C above pre-industrial levels which is likely to be reached "between 2030 and 2052 if [the trend] continues to increase at the current rate. (high confidence)". The purpose of this report was to strengthen the global response to the threat of climate change. In response to this report, the UK Government requested their advisors, the CCC, to review the UK's Climate Change Act target. Following the CCC's advice<sup>87</sup> the UK Government subsequently amended the target in May 2019<sup>65</sup>. This revised target has been used in the context of this assessment.</p>
<b>Local Guidance</b>	
<p>Luton Borough Council, Climate Action Plan Support<sup>80</sup></p>	<p>This evidence base produced by Anthesis for Luton Borough Council was used to provide an evidence base to inform the Council's Climate Action Plan (published January 2020)<sup>79</sup>. It focuses</p>

<sup>99</sup> Sustainable Aviation (2020). Sustainable Aviation Carbon Road-Map: A path to Net Zero. Available online at: [https://www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation\\_CarbonReport\\_20200203.pdf](https://www.sustainableaviation.co.uk/wp-content/uploads/2020/02/SustainableAviation_CarbonReport_20200203.pdf) [Accessed 21 October 2020].

<sup>100</sup> IPCC (2014), "AR5 Synthesis Report – Climate Change", [online]. Available at: [https://www.ipcc.ch/site/assets/uploads/2018/02/SYR\\_AR5\\_FINAL\\_full.pdf](https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf)

Guidance	Relevance
	on analysis of current emissions from the council and large businesses in Luton (including London Luton Airport) and determining future emission pathways. It aims to inform the proportion of emissions that can be influenced locally without the action of regional or national actors.

## Overview of current aviation policy landscape

- 7.3.13 As detailed above, the Climate Change Act<sup>65</sup> requires the Secretary of State to ensure the net UK carbon account is 100% below the 1990 baseline by 2050; in other words, 'net zero'. This target does not include emissions from international aviation, which are taken into account through the mechanism of leaving 'headroom' in UK carbon budgets and are to be tackled through International Civil Aviation Organization (ICAO), following the approach adopted in the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol<sup>101</sup>.
- 7.3.14 Whilst zero-carbon aviation may be challenging by 2050, the UK is supporting international efforts through ICAO to achieve 'net zero' (i.e. a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases). In the consultation paper '*Aviation 2050: the future of UK aviation*'<sup>91</sup>, published prior to the CCC's net zero recommendation<sup>87</sup> and the subsequent update to the Climate Change Act<sup>65</sup>, the Government seeks GHG emissions reductions from international aviation to be achieved through measures such as efficiency improvements and sustainable aviation fuels. Remaining emissions are then required to be offset through mechanisms such as emissions trading and the ICAO 'Carbon Offsetting and Reduction Scheme for International Aviation' (CORSIA)<sup>89</sup>.
- 7.3.15 In its Response to the CCC's 2020 Progress Report to Parliament (October 2020)<sup>92</sup> the Government has announced that it will publish a consultation on net 'zero' aviation. The Government's approach to tackling aviation's GHG emissions consistent with the UK carbon target is expected to be set out in the forthcoming Aviation Strategy which will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020. Additionally, the government is committed to negotiating in the ICAO for a long-term emissions reduction goal for international aviation that is consistent with the temperature goals of the Paris Agreement<sup>72</sup>. The Government also stated that it would be minded to include international aviation and shipping in UK carbon budgets if there is insufficient progress at international level.
- 7.3.16 The consultation document "*The future of UK aviation: making best use of existing runways*"<sup>98</sup> sets out that airport expansions under 10 million passengers per annum (mppa) should be considered at a Local Planning Authority level and take into account that the overall approach to reducing aviation GHG emissions from the UK is a matter to be tackled at a national level through the forthcoming Aviation Strategy which will be considered as part of the Net Zero Aviation Consultation due in Autumn 2020<sup>92</sup>.
- 7.3.17 In their recommendations to Government on setting the Sixth Carbon Budget, the CCC's Balanced Pathway scenario for achieving net zero by 2050 keeps GHG emissions from the aviation sector (including domestic, international, and military aviation) to 23 MtCO<sub>2</sub>e in 2050. This figure has not, however, been adopted by Government as a new 'planning assumption' for setting future UK carbon budgets and so has not been considered as the core metric for contextualisation of GHG emissions from the Proposed Scheme in this assessment.
- 7.3.18 Given that there is no existing policy that endorses the 23 MtCO<sub>2</sub>e CCC suggestion, the previous CCC recommendation of 37.5 MtCO<sub>2</sub><sup>66</sup> remains the Government's planning assumption for

<sup>101</sup> United Nations (1998). Kyoto Protocol to the United Nations Framework Convention on Climate Change. [online]. Available at: <https://unfccc.int/resource/docs/convkp/kpeng.pdf> [accessed 17 November 2020].

understanding the future of the UK aviation industry in 2050 and the Government has proposed in the Aviation 2050 consultation document that it should be accepted<sup>89</sup>. It is not known at this stage whether a lower planning assumption may be adopted at some time in the future. This is because the details of the route and specific mechanisms to reaching net zero across the UK economy in 2050 are not yet set out (it may be that other sectors are required to decarbonise further to accommodate aviation, for example). The 23 MtCO<sub>2e</sub> suggestion is therefore only considered for sensitivity testing at this stage. The policy landscape may be updated in the upcoming Aviation Strategy consultation and/or through the legislation of the sixth carbon budget (both due in 2021).

7.3.19

For the purposes of this assessment, the following assumptions about the future of the aviation sector and how that relates to this assessment are considered:

- 37.5 MtCO<sub>2</sub> from international aviation departing the UK in 2050 is the 'planning assumption' used by the UK Government in setting current UK carbon budgets<sup>66</sup> under the Climate Change Act<sup>65</sup> and it remains the most appropriate value for against which to consider the international aviation GHG emissions from the Proposed Scheme. It is supported by the statement in Aviation 2050<sup>91</sup> that the UK Government proposes to accept the CCC's previous recommendation that GHG emissions from UK departing flights should be at or below 2005 levels in 2050 (37.5 MtCO<sub>2</sub>).
- 23 MtCO<sub>2e</sub> from the UK aviation sector represents the 'Balanced Pathway scenario for the aviation sector to contribute towards the UK goal of achieving 'net zero' in 2050, as described by the CCC<sup>69</sup>. It should therefore be adopted as a 'sensitivity test' value against which to consider the aviation GHG emissions from the Proposed Scheme. This CCC Balanced Pathway suggestion is representative of what aviation policy *could* look like in the future to take into account the amended Climate Change Act<sup>65</sup>.
- Achieving net zero in the aviation sector would require increased sustainable fuel use, greenhouse gas removals/offsets and operational improvements, which will be driven by international sector-based mechanisms such as European Union Emissions Trading Scheme (EU ETS)<sup>70</sup> and CORSIA<sup>89</sup>. Robust and CORSIA-eligible offsetting opportunities in the UK, including substantial investment in Carbon Capture and Storage (CCS), are required to increase the extent of carbon removal in the UK.
- National and international-level responses to reducing aviation GHG emissions that have been put in place (e.g. Aviation Strategy, CORSIA) will be effective.
- All GHG emissions associated with the operation of LLA that are not from international aviation are considered within the context of the UK carbon target for 2050<sup>64</sup> and UK carbon budgets<sup>65</sup>. This includes domestic aviation.
- Surface access and all Scope 1 and 2 GHG emissions are also relevant to local carbon targets and plans as set by Luton Borough Council.

## 7.4 Data gathering methodology

### Study area

7.4.1

GHG emission sources have been considered for operational activities associated with the Proposed Scheme. This includes the GHG emissions resulting from activities within the application site (e.g. buildings and airside operations) and activities outside of the application site that are emitted as a direct result of the Proposed Scheme (e.g. aviation emissions and surface access emissions). There are no construction activities associated with the Proposed Scheme.

- 7.4.2 The receptor for each GHG emissions source is the global climate. Given the global impacts of climate change and the globally-recognised requirement to limit GHG emissions to maintain global average temperature increase below 2°C, as laid out in the Paris Agreement<sup>72</sup>, the receptor is considered highly sensitive to emissions. GHG emissions to the receptor are considered direct and negative, and the effects on the receptor are permanent.
- 7.4.3 Given the only receptor for GHG emissions is the global climate, the study area of the emissions from the Proposed Scheme is effectively the Earth system.

## Desk study

- 7.4.4 A summary of the organisations that have supplied data, together with the nature of that data is as follows:
- Department for Business, Energy, and Industrial Strategy (BEIS);
    - ▶ Emissions factors for traffic and transport emissions and airport building and ground operation emissions have been sourced from the BEIS Greenhouse gas reporting conversion factors 2019<sup>102</sup>;
    - ▶ BEIS 2019 Energy and Emissions Projections (EEP)<sup>103</sup> are used in the development of the future scenarios for electricity mix, and
    - ▶ BEIS national statistics of GHG emissions 1990 - 2018<sup>104</sup>
  - DfT:
    - ▶ Factors for the proportion of cars, taxis and other diesel, petrol and electric vehicles were sourced from the latest version of the DfT's TAG Data Book<sup>105</sup>, reporting up to 2050.
    - ▶ Factors for the fuel efficiency of petrol, diesel and electric use in road vehicles, and diesel and electric use for rail transport were sourced from the latest version of the DfT's TAG Data Book<sup>105</sup>, reporting up to 2050.
    - ▶ Information relating to future scenarios for the implementation of sustainable aviation fuel (SAF) use was sourced from DfT's UK Aviation Forecasts 2017<sup>95</sup>.
    - ▶ Information on average occupancy of vehicles and average commuting distance were taken from the National Travel Survey 2019<sup>106</sup>:
  - National Grid:
    - ▶ Data has been sourced from the National Grid Future Energy Scenarios (FES) 2020<sup>107</sup> on the proportion electric vehicles and electricity demand for electric vehicles, reporting up to 2050.

<sup>102</sup> BEIS (2019), Greenhouse gas reporting: conversion factors 2019 [online]. Available at <https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019> [Accessed 21 October 2020].

<sup>103</sup> BEIS (2020), Updated energy and emissions projections: 2019 [online]. Available at <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2019> [Accessed 12 November 2020].

<sup>104</sup> BEIS (2020), Final UK greenhouse gas emissions national statistics: 1990 to 2018 [online]. Available at [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/875508/final-greenhouse-gas-emissions-tables-2018.xlsx](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/875508/final-greenhouse-gas-emissions-tables-2018.xlsx) [Accessed 25 November 2020].

<sup>105</sup> Department for Transport (2020), TAG Data Book. Available at <https://www.gov.uk/government/publications/tag-data-book> [Accessed 21 October 2020].

<sup>106</sup> Department for Transport, (2018), "National Travel Survey: 2019", [online]. Available at: <https://www.gov.uk/government/statistics/national-travel-survey-2019>

<sup>107</sup> National Grid (2020), Future Energy Scenarios, FES 2020. Available at <https://www.nationalgrideso.com/future-energy/future-energy-scenarios/fes-2020-documents> [Accessed 21 October 2020].

- Office of Road and Rail (ORR):
  - ▶ Emissions for rail passenger transport have been sourced from the ORR annual data tables for rail emissions up to the period 2019-2020<sup>108</sup>.
- CCC:
  - ▶ Advice on the future uptake of sustainable aviation fuels and aircraft efficiency has been sourced from historical CCC reports<sup>67, 109, 110</sup> and guidance provided in letters to the Secretary of State for Transport<sup>111</sup>.
  - ▶ Advice on future aviation policy requirements in order to achieve a 'Balanced Pathway' to net zero including aircraft efficiencies and increased ambition relating to uptake of sustainable aviation fuels<sup>69</sup>.
- Sustainable Aviation:
  - ▶ Emissions factors associated with improvements in air traffic management and operational practices has been sourced from the Sustainable Aviation Roadmap<sup>99</sup>.
  - ▶ Information relating to the prospective use of sustainable aviation fuels and improvements in aircraft efficiency has been sourced from the Sustainable Aviation Roadmap<sup>99</sup>.
- European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA):
  - ▶ The EMEP/EEA Emission Factor Database<sup>96</sup> has been used as one of the main sources of data for aviation emissions associated with the Proposed Scheme.
- International Civil Aviation Organisation (ICAO) Aircraft Engine Emissions:
  - ▶ The ICAO *Aircraft Engine Emissions Databank*<sup>112</sup> has been used as one of the main sources of data for aviation emissions associated with the Proposed Scheme.
- UK Civil Aviation Authority (CAA) Passenger Survey Report 2019<sup>113</sup> has been used to determine the origin/destination of terminating passengers. A representative distance has then been determined between the regions of the UK and LLA. This is based on average travel distance (km) by road or rail from major cities or stations within the region. Modal splits for 2019 passenger travel are based on raw data of last mode of transport provided to London Luton Airport Operations Limited (LLAOL) by CAA in summer 2020.
- LLAOL:
  - ▶ Staff Travel Survey 2019 conducted by Systra on behalf of LLAOL;

<sup>108</sup> ORR (2020), Table 6100 - Estimates of normalised passenger and freight carbon dioxide equivalent (CO<sub>2e</sub>) emissions. Available at <https://dataportal.orr.gov.uk/statistics/infrastructure-and-emissions/rail-emissions/> [Accessed 17 November 2020].

<sup>109</sup> Committee on Climate Change (2018), Biomass in a low-carbon economy, Committee on Climate Change Nov 2018. Available at <https://d423d1558e1d71897434.b-cdn.net/wp-content/uploads/2018/11/Biomass-in-a-low-carbon-economy-CCC-2018.pdf>

<sup>110</sup> Committee on Climate Change (2012), Aviation – Fact Sheet. Available at <https://www.theccc.org.uk/wp-content/uploads/2013/04/Aviation-factsheet.pdf>

<sup>111</sup> Committee on Climate Change (2019), "Letter: Aviation 2050 – The future of UK aviation", [online]. Available at <https://www.theccc.org.uk/wp-content/uploads/2019/02/Aviation-Letter-from-Lord-Deben-to-Chris-Grayling.pdf>

<sup>112</sup> ICAO (2017). ICAO Aircraft Engine Emissions Databank, [online]. Available at: <https://www.easa.europa.eu/easa-and-you/environment/icao-aircraft-engine-emissions-databank>

<sup>113</sup> CAA. (2020). 2019 Passenger survey report [online]. Available at: <https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/2019-Passenger-survey-report/>

- ▶ London Luton Annual Monitoring Report 2019<sup>114</sup> was used to determine staff working patterns;
- ▶ Employee number forecast based on increased number of passengers;
- ▶ Scope 1 and 2 GHG emissions and non-aviation Scope 3 emissions for diesel usages in third party vehicles from the 2019 Carbon Footprint Report<sup>115</sup>.

7.4.5 The assessment is based on the data sources described above and has been provided in Appendix 7A, including:

- Airport building and ground operation GHG emissions at LLA have been provided using corporate reporting data from 2019 and internal LLAOL data;
- Surface access forecasts, including modal split targets for passenger trips and employee trips as detailed in the Travel Plan (Chapter 10: Transport);
- Air Traffic Movement forecast for future scenarios including Landing and Take-Off (LTO) and climb, cruise and descent (CCD) phase forecast emissions of the Proposed Scheme.

### Survey work

7.4.6 No survey work has been necessary specifically for the assessment of greenhouse gases, but the results of the traffic surveys described in the Transport Assessment (**Chapter 10: Transport**) have been used in the assessment in this chapter.

## 7.5 Overall baseline

### Current baseline

7.5.1 2019 baseline emissions are presented in **Table 7.3**. These emissions represent the most up-to-date information available for GHG emissions at LLA.

Table 7.3 GHG emissions/year for the 2019 baseline

Source	Activity	2019 (baseline) (ktCO <sub>2</sub> e / yr*)
Aviation	International aviation	1,033.83 ktCO <sub>2</sub> / yr
	Domestic aviation	41.86 ktCO <sub>2</sub> / yr
Surface access	Passengers	396.06
	Employees	9.69
Airport buildings and ground operations	Grid electricity	10.10
	Gas usage	1.5

<sup>114</sup> London Luton Airport (2019). Annual Monitoring Report 2019. [online] Available at: <https://www.caa.co.uk/Data-and-analysis/UK-aviation-market/Consumer-research/Departing-passenger-survey/2019-Passenger-survey-report/> [Accessed 04 November 2020].

<sup>115</sup> London Luton Airport (2020). LLA Carbon Footprint Report Jan 2020. [online]. Available at: <https://www.london-luton.co.uk/CMSPages/GetFile.aspx?guid=50af686c-ffae-49fd-981d-180f588dd5d6> [Accessed 04 November 2020].

Source	Activity	2019 (baseline) (ktCO <sub>2e</sub> / yr*)
	Diesel (heating)	0.10
	Diesel (power)	0.10
	Diesel (vehicles LLAOL)	1.08
	Diesel (vehicles third party)	0.67
	Refrigerants	0.27
<b>Total</b>		<b>1,495.26</b>

\* emissions are quoted in units ktCO<sub>2e</sub> / yr unless otherwise stated for aviation emissions which are reported in ktCO<sub>2</sub>/yr.

7.5.2 The most up-to-date statistics for aviation emissions from the UK as a whole are from 2018. International aviation emissions are 36.3 MtCO<sub>2</sub>, and 36.7 MtCO<sub>2e</sub><sup>104</sup>. Estimates for 2019 aviation emissions from the UK as a whole suggest a 1.7% increase in international aviation emissions 37.3 MtCO<sub>2e</sub> and sector emissions (spanning domestic, international, and military aviation) of 39.63 MtCO<sub>2e</sub><sup>69</sup>.

### Future baseline

7.5.3 The 'without development' case is representative of an 18 mppa airport and therefore is used to define the future baseline. Comparison of the 'with development' case (i.e. the proposed 19 mppa airport) are presented in **Section 7.10**.

7.5.4 To represent projected market and policy trends, improvement factors for carbon emission reductions in the future have been embedded into the GHG assessment. The future baseline has therefore been calculated under three future emission scenarios (upper, central, and lower emission scenarios). Full details of this process and method are described **Section 7.9** and **Appendix 7A**.

7.5.5 As a representation of the future baseline, emissions from the 'without development' central emission scenario are shown in **Table 7.4**. Given the above it should be noted that the future baseline is variable under different emission scenarios and the relevant assessment has been used for comparison with the 'with development' case in **Section 7.10**. Equivalent representations for future baseline under the upper and lower emission scenarios are described in **Appendix 7A**.

Table 7.4 GHG emissions/year for the 18 mppa future baseline in the 'without development' case for the central emission scenario.

Source	Activity	2024 (ktCO <sub>2e</sub> / yr*)	2028 (ktCO <sub>2e</sub> / yr*)	2032 (ktCO <sub>2e</sub> / yr*)	2040 (ktCO <sub>2e</sub> / yr*)	2050 (ktCO <sub>2e</sub> / yr*)
<b>Aviation</b>	International aviation	992.96 ktCO <sub>2</sub> /yr	941.00 ktCO <sub>2</sub> /yr	871.36 ktCO <sub>2</sub> /yr	863.38 ktCO <sub>2</sub> /yr	723.69 ktCO <sub>2</sub> /yr
	Domestic aviation	38.51 ktCO <sub>2</sub> /yr	37.57 ktCO <sub>2</sub> /yr	34.61 ktCO <sub>2</sub> /yr	34.29 ktCO <sub>2</sub> /yr	28.74 ktCO <sub>2</sub> /yr
	Passengers	279.55	251.80	224.69	137.78	71.21

Source	Activity	2024 (ktCO <sub>2</sub> e / yr*)	2028 (ktCO <sub>2</sub> e / yr*)	2032 (ktCO <sub>2</sub> e / yr*)	2040 (ktCO <sub>2</sub> e / yr*)	2050 (ktCO <sub>2</sub> e / yr*)
Surface access	Employees	8.57	7.73	6.95	4.30	2.28
	Grid electricity	8.22	4.38	4.01	3.21	3.21
Airport buildings and ground operations	Gas usage	1.50	1.50	1.50	1.50	1.50
	Diesel (heating)	0.10	0.10	0.10	0.10	0.10
	Diesel (power)	0.10	0.10	0.10	0.10	0.10
	Diesel (vehicles LLAOL)	1.08	1.08	1.08	1.08	1.08
	Diesel (vehicles third party)	0.67	0.67	0.67	0.67	0.67
	Refrigerants	0.27	0.27	0.27	0.27	0.27
<b>Total</b>		1,331.53	1,246.20	1,145.34	1,046.67	832.84

\* emissions are quoted in units ktCO<sub>2</sub>e/yr unless otherwise stated for aviation emissions which are reported in ktCO<sub>2</sub>/yr.

A location-based approach has been used to calculate GHG emissions according to the GHG Protocol.

Aviation forecasts are provided up to 2032 and are then assumed to remain constant. Surface access targets are included up to 2024 and then are assumed to remain constant.

## 7.6 Consultation

7.6.1 **Table 7.5** provides an overview of climate issues that were raised during the non-statutory consultation, identifies how the EIA has had regard to those issues, and where further information can be found in this chapter.

Table 7.5 Overview of issues raised during non-statutory consultation regarding climate change

Issue raised	Consultee	Response and how considered in this chapter	Section Ref
<b>Respondents proposed that the airport should endeavour to reduce its impact on climate change and to meet net-zero targets through reductions in passengers and movements, limiting operations to aircraft with the lowest carbon emissions, and that profits be invested to combat climate change and meeting international and national policies and targets.</b>	Various	The assessment has identified the impact of the increase in GHG emissions from the Proposed Scheme on the global climate. It identifies the extent to which the magnitude of emissions associated with the 19 mppa airport, compared to the existing 18 mppa airport affects the ability to meet national budgets and targets for climate change.  LLAOL has since 2019 implemented differential charging to the airlines to incentivise the rapid modernisation of fleet to help reduce emissions.	<b>Section 7.9</b>

## 7.7 Scope of the assessment

### Spatial scope

- 7.7.1 The receptor for all emissions is the global climate.
- 7.7.2 For the purposes of this climate assessment, emissions have been split into three sources<sup>116</sup>:
- Aviation (domestic and international), including:
    - ▶ Climb, cruise and descent (CCD) phase constituting climb from 3,000 ft (914m), cruise and descent to 3,000 ft; and
    - ▶ Landing and Take Off (LTO) cycle which accounts for aviation movements below 3,000 ft.
  - Surface access (staff and passengers); and
  - Airport buildings and operations, including:
    - ▶ Energy and on-site use including Scope 1 (gas use, diesel for fleet vehicles, heating/red diesel, and refrigerants);
    - ▶ Scope 2 (grid electricity) emissions; and
    - ▶ Scope 3 (other indirect emissions) from third party diesel usage for vehicles.
- 7.7.3 Emissions from non-aviation operations are under the control by the owner/operator during the operation phases of the Proposed Scheme. LLAOL monitors its Scope 1 and 2 GHG emissions and reports them annually in the publicly available Carbon Footprint Report<sup>115</sup>.
- 7.7.4 LLAOL has strong influence over surface access emissions, for example through the development of the Travel Plan and investments in infrastructure such as the Direct Air-Rail Transit (DART)<sup>117</sup>.
- 7.7.5 LLAOL has limited influence over aviation emissions, the reduction of which are predominantly driven by international mechanisms such as CORSIA<sup>89</sup>.

### Temporal scope

- 7.7.6 The temporal scope of the GHG assessment has been increased to consider quantifications of GHG emissions up to 2050. This takes account of airport operations up to the date of the UK Government's net zero target, as defined in the Climate Change Act 2008 (as amended)<sup>65</sup>. There are no construction activities associated with the Proposed Scheme.
- 7.7.7 Forecasts for GHG emissions in the 'with development' case (i.e. a 19 mppa airport) are compared to forecasts for GHG emissions in the 'without development' case (i.e. an 18 mppa airport). In each case, forecasts are produced for the following assessment years:
- 2024 – the year at which the proposed planning capacity of 19 mppa is forecasted to be reached;

<sup>116</sup> Note that the usual Scope 1, 2 and 3 system of GHG reporting is not applied, as the contextualisation of emissions in the assessment blurs the boundaries between the three scopes. For example, there are different contextualisation approaches for each of international aviation emissions, domestic aviation emissions, surface access emissions and water consumption, even though they are all scope 3 emissions.

<sup>117</sup> London Luton Airport. Direct Air-Rail Transit (DART). [online]. Available at: <https://dart.llal.org.uk/>

- 2028 – the year to which the proposed noise contour condition is suggested;
- 2032 – a representative year at which airline transition to “next generation” aircraft should be complete based on current technologies available and commitments made;
- 2040 – the time period that aligns with the local policy aim for a carbon neutral Luton Borough; and
- 2050 – the year of the UK Government’s legislative net zero target<sup>65</sup>.

7.7.8 Due to the long-lived nature of CO<sub>2</sub> in the global atmosphere, the effect of GHG emissions on the receptor are treated as permanent.

### Potential receptors

7.7.9 The receptor for each GHG emissions source is the global climate. Given the global impacts of climate change and the globally-recognised requirement to limit GHG emissions to maintain global average temperature increase below 2°C, as laid out in the Paris Agreement<sup>72</sup>, the receptor is considered highly sensitive to emissions. GHG emissions to the receptor are considered direct and negative, and the effects on the receptor are permanent.

### Likely significant effects

7.7.10 The likely significant climate change effects that will be taken forward for assessment in the ES are summarised in **Table 7.6**.

Table 7.6 Likely significant climate change effects

Activity	Effect	Receptor
<b>GHG emissions associated with the Proposed Scheme (aviation emissions, surface access and airport building and ground operations)</b>	The cumulative GHG emissions over the design life of the Proposed Scheme will be contextualised against relevant climate targets, aims and budgets. Increases (decreases) to emissions to the global climate receptor are considered direct, negative (positive) and permanent in all cases.	Global climate

## 7.8 Environmental measures embedded into the development proposals

7.8.1 This section outlines the embedded measures committed to as part of the 19 mppa application and how these embedded measures have influenced the climate assessment.

7.8.2 Some mitigations have been developed for the purposes of the expansion (e.g. the Travel Plan, see **Chapter 10: Transport**) while others are ongoing independent of expansion (e.g. Scope 1 and 2 improvements). The aviation forecasts have been produced specifically for the purposes of understanding the impacts of expansion and constitute realistic forecasts of future aircraft movements based on commercial arrangements with airlines which are constantly evolving.

7.8.3 The mitigations embedded into the assessment provide a reasonable projection of the airport operations in 2024, 2028, and 2032. However, it should be noted that there is always a high degree of uncertainty in such a forecast. No additional mitigations are included beyond this date.

## Airport building and ground operation emissions

- 7.8.4 LLAOL is committed to reducing emissions within their control. LLAOL achieved Level 1 'Mapping' certification within the Airport Carbon Accreditation (ACA) Scheme in March 2020 and aim to achieve further Level 2 'Reduction' and Level 3 "Optimisation" in the future.
- 7.8.5 LLAOL has implemented a number of measures to reduce emissions which are captured in the 2019 baseline. These include the following measures as described in London Luton Airport Carbon Footprint Report 2020<sup>115</sup>:
- Installation of air handling unit upgrades saving over 1.3 million kWh per year;
  - Upgrading boilers, reducing gas consumption by 16%; and
  - Installation of LED lighting, reducing electricity demand by over 1 million kWh per year.
- 7.8.6 LLAOL has set commitments to further reduce emissions which are set out in the Responsible Business Strategy 2020-2025<sup>118</sup> and are captured in the assessment under the relevant future time period scenarios:
- Sourcing all electricity from renewable sources by the end of 2021;
  - Generating at least 25% of electricity demand from on-site renewables by 2026; and
  - Reducing operational electricity demand (excluding vehicles) to less than 2.0 kWh/pax by end of 2023.

## Surface access emissions

- 7.8.7 The Travel Plan (**Chapter 10: Transport**) sets out objectives and targets with a series of measures around the promotion of walking, cycling, use of public transport and reducing single car occupancy for both passengers and staff under the 'with development' case. Of specific note to the climate assessment, the following targets are quantified within the assessment of the 'with development' case:
- Passengers travelling to and from the airport by rail will increase to 25% in the 19 mppa scenario by 2024;
  - Passengers travelling to and from the airport by bus/coach will increase to 17% in the 19 mppa scenario by 2024;
  - Staff travelling to and from the airport by rail will increase to 10% in the 19 mppa scenario by 2024; and
  - Staff travelling to and from the airport by bus will increase to 17% in the 19 mppa scenario by 2024.
- 7.8.8 These targets are driven through a number of projects and actions, described in the Travel Plan Action Plan (**Chapter 10: Transport**) including:
- Incorporate secure cycle parking facilities within the design of all buildings within the site. Ensure cycle storage facilities are well lit, secure and offer protection from the weather;
  - Promotion and marketing of DART upon launch;

<sup>118</sup> London Luton Airport (2020). Responsible Business Strategy 2020-2025 [online]. Available at: <https://www.london-luton.co.uk/CMSPages/GetFile.aspx?guid=eb79ca97-d37c-4803-9f89-c4965a466814> [Accessed 04 November 2020].

- By continuing to promote local bus and coach travel and build upon previous attempts to promote the Luton Dunstable Busway;
- By continuing to promote the Staff Discount Travel Card; and
- By ensuring the provision of live travel information and timetables for staff and passengers for bus stops and train times.

7.8.9 A full list of actions can be found in the Action Plan contained within the Travel Plan (**Chapter 10: Transport**).

7.8.10 The improved surface access targets described in paragraph 7.8.7 are reflected in the 'with development' case from 2024 onwards. As there are no commitments beyond 2024, no further reductions in emissions is applied. Additional targets within the Travel Plan that cannot be quantified are not embedded within the quantification of GHG emissions and so are considered as additional mitigation (see **Section 7.13**).

7.8.11 Surface access targets within the 'without development' case are based on targets within the 2019 ASAS re-issue<sup>119</sup>.

7.8.12 LLAOL will continue to monitor, report and review targets through the Surface Access Strategy monitoring process.

## 7.9 Assessment methodology

### Overall approach

7.9.1 The generic project-wide approach to the assessment methodology is set out in **Chapter 4**, and specifically in **Sections 4.6 to 4.8**. However, whilst this has informed the approach that has been used in this climate assessment, it is necessary to set out how this methodology has been applied, and adapted as appropriate, to address the specific needs of this climate assessment.

7.9.2 The overall approach to quantifying GHG emissions associated with the Proposed Scheme is to forecast the relevant GHG emissions sources for the 'with development' case (i.e. the 19 mppa planning capacity case) and the 'without development' case (i.e. the 18 mppa future baseline case) in 2024, 2028, 2032, 2040, and 2050. The GHG emissions sources are:

- Aviation;
- Surface access; and
- Airport buildings and operations.

7.9.3 The detailed methodology for quantifying each GHG emissions source can be found in **Appendix 7A in Volume 3: Figures and appendices**.

7.9.4 Emission factors for carbon emission reductions in the future, have been embedded into the GHG emissions calculations in the following areas:

- Vehicle splits by fuel type (petrol, diesel, and electric vehicles) for cars, taxis and LGV;
- Vehicle efficiency improvements for cars, taxis, buses and coaches, and rail;
- UK grid electricity generation efficiency improvements;

<sup>119</sup> London Luton Airport (2019). LLAOL Airport Surface Access Strategy 2019 Reissue [online]. Available at: <https://www.london-luton.co.uk/CMSPages/GetFile.aspx?guid=a31129aa-284b-4b4c-aae0-ed0208d70fec> [Accessed 04 November 2020].

- Air traffic management and operation improvements;
- Aircraft and engine efficiencies (only included beyond 2040)
- Sustainable aviation fuel (only included in 2050 in line with current projections available).

7.9.5 A range of scenarios are presented to reflect the uncertainties in the projections:

- **Upper emission scenario:** This scenario assumes a relatively small amount of GHG emissions reductions in the areas listed above, and thus represents a conservative projection;
- **Central emission scenario:** This scenario aligns with current or anticipated policy and market trends in the majority of areas listed above. In some cases, a central point between the upper and lower scenario is used; and
- **Lower emission scenario:** this scenario assumes more substantial improvements in GHG emissions reductions in the areas listed above, and thus represents an optimistic projection.

7.9.6 The Government's Ten Point Plan for a green industrial revolution<sup>77</sup> (released 18 November 2020) includes a commitment to bring forward the date at which sales of new petrol and diesel cars will be banned to 2030. Government and industry modelling of vehicle fuel splits under future scenarios have not yet been updated to reflect this new target. The scenario used in this assessment are therefore considered conservative in all cases. For example, the most ambitious scenario considered for the lower emission scenario is based on the National Grid Future Energy Scenarios (FES)<sup>107</sup> Leading the Way scenario which has an assumption that the sale of new petrol, diesel and hybrid cars and vans is ended from 2032.

7.9.7 The Ten Point Plan<sup>77</sup> also includes statements to support the uptake of sustainable aviation fuels and zero-emission aircraft. Further details of these measures will be consulted on in the Aviation Decarbonisation Strategy in 2021 and have therefore not been included in the assessment.

7.9.8 Achieving the aviation sector target of 23 MtCO<sub>2</sub>e/yr in 2050 in the CCC's 'Balanced Pathway' scenario requires policy implementation. Policy recommendations have been given by in the Sixth Carbon Budget report and have been used to create a fourth future scenario for the sensitivity assessment. This is shown alongside the upper, central, and lower emission scenarios in this sensitivity assessment and details are provided in **Appendix 7A** in **Volume 3: Figures and appendices**.

## Consideration of non-CO<sub>2</sub> aviation emissions

7.9.9 CO<sub>2</sub> makes up around 99% of the Kyoto Protocol<sup>101</sup> GHG emissions associated with aviation, with the other 1% coming from Nitrous Oxide (N<sub>2</sub>O). The combustion of fuel by aircraft also results in emissions of water vapour, nitrogen oxides (NO<sub>x</sub>) and aerosols; furthermore, at altitude, condensation can result in the formation of linear ice clouds (contrails) and lead to further aviation-induced cloudiness; these are sometimes referred to as non-CO<sub>2</sub> effects. Recent research into the impacts of non-CO<sub>2</sub> effects has suggested that they could be up to three times that associated with CO<sub>2</sub> emissions alone<sup>120</sup>.

7.9.10 While there is a high confidence level in CO<sub>2</sub> emissions from aviation sources, non-CO<sub>2</sub> effects are associated with much greater uncertainty. The confidence level has been based on a combination of evidence (limited, medium, robust) and agreement (low, medium, and high). Confidence is low for contrail cirrus, low for emissions of nitrogen oxides, medium for water vapour emissions in the stratosphere (including soot and sulphur emissions) and very low for aerosol-cloud interactions. As

<sup>120</sup> Lee et al., (2020), "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018", *Atmospheric Environment*, 244 (117834), DOI: 10.1016/j.atmosenv.2020.117834

such, these aviation emission sources remain areas of active climate change research and policy discussion.

- 7.9.11 The state of scientific knowledge on non-CO<sub>2</sub> effects is deemed too uncertain for accurate measurement at this stage and there is no consensus on: how such emissions should be measured; the metric against which to express an impact; or the significance of such an impact.
- 7.9.12 As such, non-CO<sub>2</sub> effects for aviation are not currently included in any domestic or international legislation or emission targets, including the Paris Agreement<sup>72</sup>. The relevant expert body, the CCC, had advised that the appropriate approach at a domestic level was *"not to assess or include the impact of non-CO<sub>2</sub> effects, given the significant scientific uncertainty surrounding their scale"*. The CCC has subsequently advised the UK Government that consideration should be given on *"how best to tackle [non-CO<sub>2</sub> effects] alongside UK climate targets"*<sup>93</sup>, although this remains outstanding.
- 7.9.13 The Government has indicated that the net zero aviation consultation will provide information on the latest evidence on non-CO<sub>2</sub> effects. They previously stated that the UK will work through ICAO on measures to regulate aircraft non-CO<sub>2</sub> effects, expecting ICAO to issue best practice guidance on mitigations for non-CO<sub>2</sub> effects<sup>92,91</sup>.
- 7.9.14 While it is acknowledged that non-CO<sub>2</sub> effects may well have a climate impact, they have not been considered in this assessment. This is on the basis that the impacts could not be adequately quantified due to the level of scientific uncertainty, and in any case, they cannot be contextualised given that there is no international framework for considering them and current policy and emission targets do not include them.

## Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme

- 7.9.15 Current Institute of Environmental Management and Assessment (IEMA) principles and guidance<sup>83,84</sup> states that due to the combined environmental effect that they have, any GHG emissions (either positive or negative) from a project might be considered to be significant. Therefore, the assessment methodology aims to determine the relative scale of the impact of the Proposed Scheme on global climate change by considering the sensitivity (or value) of the receptor, its impacts, and the magnitude of that impact on relevant carbon budgets and targets at a national and local level.

### Sensitivity

- 7.9.16 The only receptor for the climate assessment is the global climate. The global climate is the largest inter-related cumulative environmental effect<sup>83</sup>, so the receptor can be considered highly sensitive.

### Magnitude

- 7.9.17 To identify the relative magnitude of GHG emissions of a single project on the receptor (i.e. the global climate), an approach for contextualisation must be used.

- 7.9.18 The magnitude of the Proposed Scheme has been evaluated against the following two criteria:

#### 1) The extent to which the scheme materially affects the ability of the UK to meet the aviation 'planning assumption':

The scale of international aviation GHG emissions in the 'with development' case is contextualised within the current UK 'planning assumption' for international aviation of 37.5 MtCO<sub>2</sub><sup>66</sup>. The CCC

'Balanced Pathway' value for GHG emissions from the aviation sector of 23 MtCO<sub>2e</sub><sup>69</sup>, which is not current Government policy, is also considered as a sensitivity assessment<sup>121</sup>.

**2) The extent to which the scheme affects the ability of the UK to meet its target and budgets:**

The scale of the GHG emissions from all sources except international aviation in the 'with development' case is contextualised within their overall impact on the UK Government's UK carbon target of 'net zero' in 2050<sup>65</sup> and UK carbon budgets<sup>66</sup>. The scale of the GHG emissions from all sources except aviation in the 'with development' case is also considered within context of local objectives for reducing GHG emissions. Therefore, the extent to which the scheme affects the ability of Luton Borough Council to meet its climate change objectives for a carbon neutral borough by 2040<sup>79</sup> is taken into account. However, as the local objectives are not yet part of local planning policy, they are not given the same weight as the national Net Zero target and the associated budgets.

7.9.19 The magnitude of the GHG emissions from the Proposed Scheme is determined based on **Table 7.7**.

Table 7.7 Magnitude criteria

Magnitude	Magnitude criteria
<b>High (adverse)</b>	Net increases in GHG emissions associated with the Proposed Scheme are considered to materially affect the ability of the UK Government to meet their carbon budgets/targets.
<b>Low (adverse)</b>	Net increases in GHG emissions associated with the Proposed Scheme are considered to not materially affect the ability of the UK Government to meet their carbon budgets/targets.
<b>Negligible</b>	GHG emissions associated with the Proposed Scheme are approximately neutral compared to the without development case, and thus there is no implication for carbon budgets/targets.
<b>High (beneficial)<sup>122</sup></b>	Net decreases in GHG emissions associated with the Proposed Scheme are considered to materially affect the ability of the UK Government to meet their carbon budgets/targets.

Determination of effect

7.9.20 Given that the sensitivity of the receptor (i.e. the global climate) is always high, there will be a residual adverse or beneficial effect of the project on the global climate depending on the relative levels of the 'with development' and 'without development' cases. The extent of that effect is assessed as described in **Table 7.8**.

<sup>121</sup> The CCC recommendation for the aviation sector is based on CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions. Given the planning assumption is based on CO<sub>2</sub> emissions only, aviation emissions from LLA have been assessed as CO<sub>2</sub> emissions only. The sensitivity is therefore an under-estimation of total GHG emissions contributing towards the recommended target.

<sup>122</sup> Note that any reduction in GHG emissions compared to the 'without development' case are considered to have a high beneficial magnitude, so there is no low magnitude.



Table 7.8 Determination of effect matrix

Magnitude	Effect
Negligible	None
Low	Minor
High	Major

7.9.21 In EIA terms, a minor adverse effect is considered not significant, while a major adverse effect is considered significant.

## 7.10 Quantification of GHG emissions

7.10.1 This section summarises the predicted GHG emissions in the 'with development' case where 19 mppa is reached in 2024. Emissions are compared relative to the 2019 baseline, to show the increase in emissions from all operations at LLA. Emissions are also compared relative to the 'without development' case, where the capacity of 18 mppa remains, to show emissions associated with the Proposed Scheme only.

7.10.2 The information in this section is used to inform the assessment effects in **Section 7.11**.

### Total emissions

7.10.3 Projected GHG emissions for the baseline case, 'without development' and 'with development' cases for the assessment years 2024, 2028, 2032, 2040 and 2050 in three future scenarios (upper emission, central emission, and lower emission scenarios) are shown in **Table 7.9**.

Table 7.9 Total GHG emissions (ktCO<sub>2e</sub>/yr) in the 2019 baseline, 'without development' and 'with development' cases in the upper, central and lower emission scenarios.

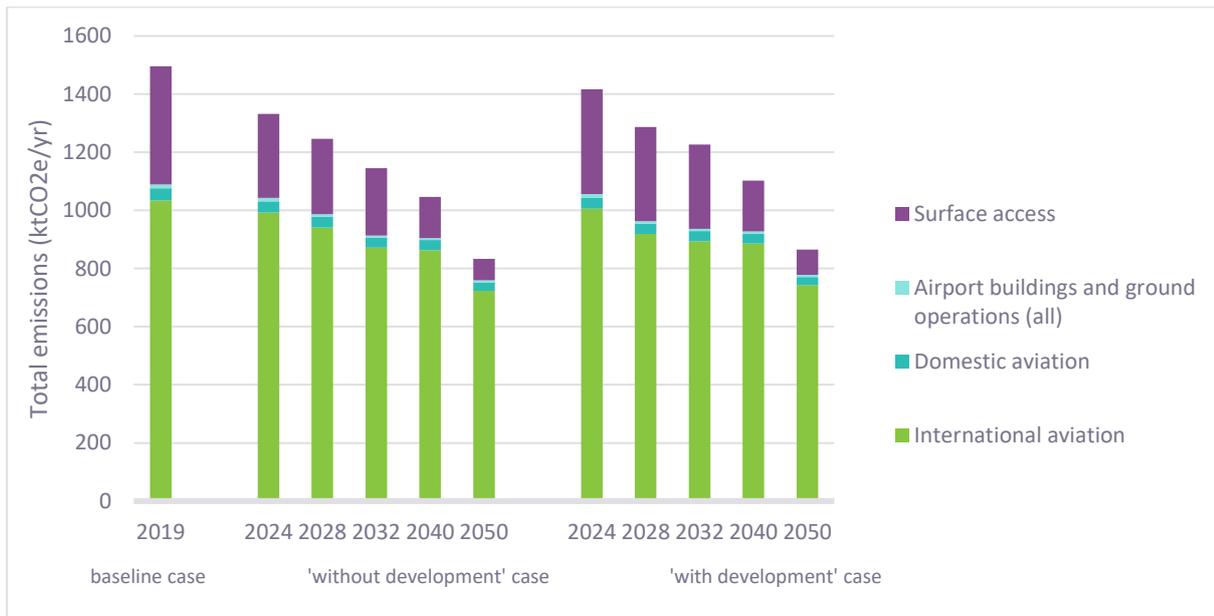
	2019 baseline*	2024		2028		2032		2040		2050	
		Without development	With development								
<b>Upper emission scenario</b>		1339.87	1425.47	1265.16	1307.46	1180.24	1266.23	1159.33	1239.89	1048.59	1121.95
<b>Central emission scenario</b>	1495.26	1331.53	1416.73	1246.20	1287.15	1145.34	1226.06	1046.67	1101.98	832.84	865.26
<b>Lower emission scenario</b>		1317.13	1400.22	1208.07	1241.85	1059.00	1119.59	936.42	967.40	734.90	754.69

Total emissions cover all aviation emissions (domestic and international), surface access emissions (passengers and employees), and airport building and ground operation. Note a location-based approach has been used to determine emissions from electricity procurement.



7.10.4 A breakdown of total projected GHG emissions by source for the central emission scenario are shown in **Figure 7.1**. This illustrates the overall GHGs associated with LLA in the 2019 baseline, 'without development' and 'with development' cases. Equivalent representations for the upper and lower emission scenarios are shown in **Appendix 7A** in **Volume 3: Figures and appendices**. A summary of the results is provided below.

Figure 7.1 Total GHG emissions for the 2019 baseline, the 'without development' and 'with development' cases for the central scenario.



Note: Aviation emissions are by convention reported as CO<sub>2</sub> emissions<sup>123</sup>. This reflects the uncertainties associated with non-CO<sub>2</sub> emissions (see **Section 7.9**). All other emissions sources are reported in CO<sub>2e</sub> which is defined as the sum of all GHG emissions multiplied by their global warming potential. For aviation, since only CO<sub>2</sub> is reported with a global warming potential of one, 1 tonne of CO<sub>2</sub> is equal to 1 tonne of CO<sub>2e</sub> and hence no conversion is needed to sum together these emission sources.

Note a location-based approach has been used to determine emissions from electricity procurement.

7.10.5 Relative to the 2019 baseline, total GHG emissions in the 'with development' case decrease in all future scenarios.

7.10.6 In 2050, total GHG emissions in the 'with development' case are below 2019 baseline values in all scenarios. In 2050, total GHG emissions from the 'with development' case are 373.3 – 740.6 ktCO<sub>2e</sub>/yr lower than the 2019 baseline case, representing a 25 – 50% reduction in total GHG emissions relative to the 2019 baseline.

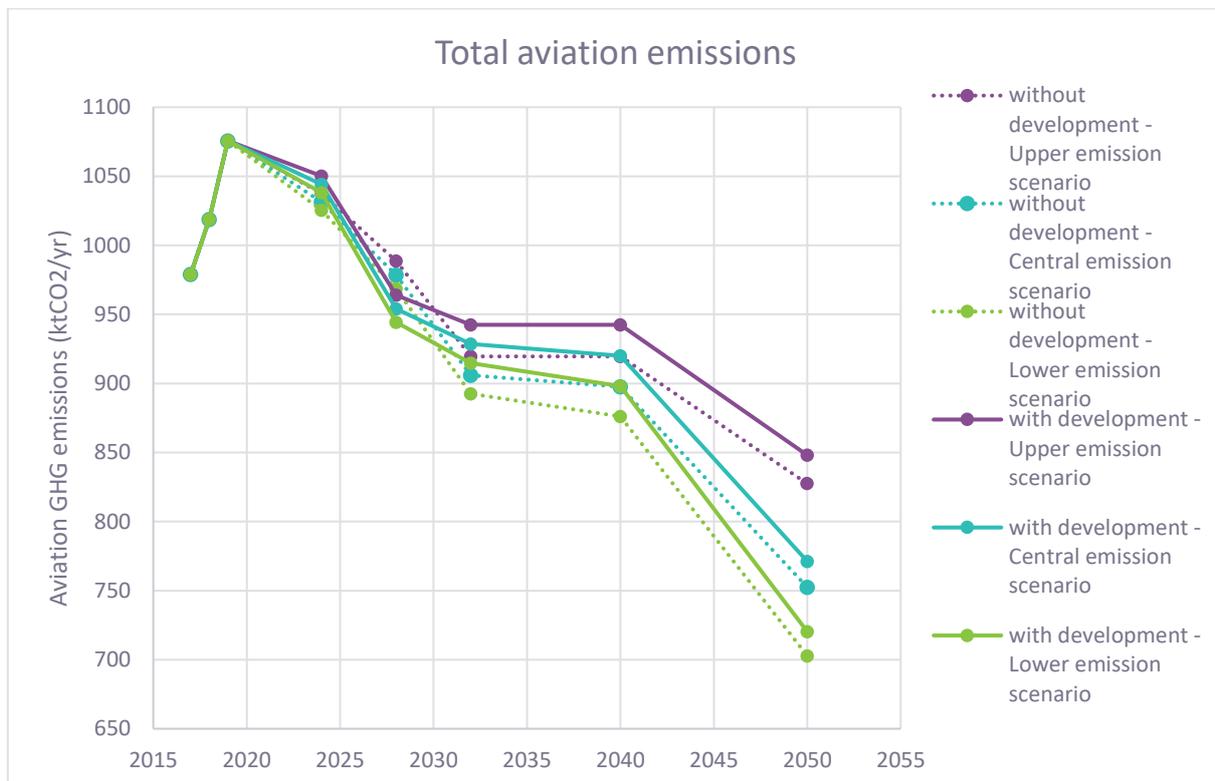
7.10.7 GHG emissions in the 'with development' case peak in the 2024 assessment year in all future scenarios. This is primarily due to fact that passenger forecasts for the Proposed Scheme are assumed to be constant beyond 2024 while efficiency improvements (see **Section 7.9**) continue. At their peak in 2024, total GHG emissions associated with the 'with development' case are 69.8 – 95 ktCO<sub>2e</sub>/yr lower compared to the 2019 baseline, dependent on the future scenario considered.

<sup>123</sup> ICAO (2010), ICAO Environment Report, Chapter 1, Aviation's Contribution to Climate Change [online]. Available at: [https://www.icao.int/environmental-protection/Documents/EnvironmentReport-2010/ICAO\\_EnvReport10-Ch1\\_en.pdf](https://www.icao.int/environmental-protection/Documents/EnvironmentReport-2010/ICAO_EnvReport10-Ch1_en.pdf) [Accessed 21 October 2020].

## Aviation emissions

7.10.8 Total projected aviation GHG emissions from LLA for the 2019 baseline, 'without development' and 'with development' cases for the assessment years 2024, 2028, 2032, 2040 and 2050 in the three future scenarios (upper, central, and lower emission scenarios) are shown in **Figure 7.2** (see **Appendix 7A** in **Volume 3: Figures and appendices** for associated data, including splits for domestic and international aviation). 'Latest generation' aircraft, including Airbus NEO and Boeing MAX classes, are included in the aircraft forecasts. Note that no 'next generation' aircraft beyond the current Airbus NEO and Boeing MAX classes are considered in the aircraft forecasts.

Figure 7.2 Total aviation GHG emission forecasts for the 'with development' and 'without development' cases in all scenarios



7.10.1 Relative to the 2019 baseline, aviation GHG emissions in the 'with development' case are lower in all scenarios for all assessment years. This is because in both the 'with development' and 'without development' cases the fleet composition includes the latest generation of aircraft.

7.10.9 In 2050, total aviation GHG emissions in the 'with development' case are 720.4 – 848.1 ktCO<sub>2</sub>/yr, a decrease of 227.6 – 355.3 ktCO<sub>2</sub>/yr (equivalent to a 21 – 33% decrease in total aviation GHG emissions), relative to the 2019 baseline conditions.

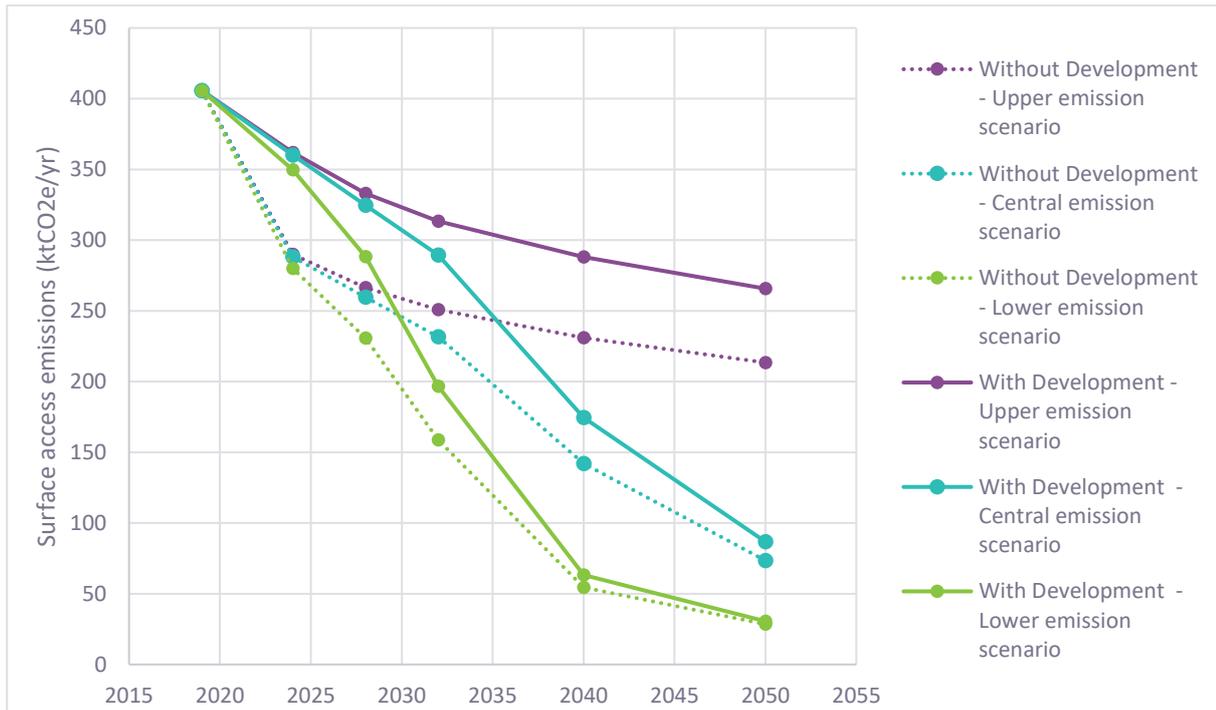
7.10.10 The transition to the latest generation of aircraft occurs more rapidly in the 'with development' case than the 'without development' case. This is as a result of increased capacity encouraging airlines to consolidate the newer, larger, aircraft into their fleet at London Luton Airport. Therefore, GHG emissions from the 'with development' case are lower than the 'without development' case in 2028. By 2032, the transition to the latest generation of aircraft has taken hold in the 'without development' case, meaning the emissions are lower than the 'with development' case.

7.10.2 The further reductions in GHG emissions through to 2050, which benefit both the 'with development' and 'without development' cases, are based on assumed further efficiencies due to future next generation aircraft (from 2040) and the introduction of sustainable aviation fuels.

### Surface access emissions

7.10.11 Projected surface access GHG emissions for the 2019 baseline, 'without development' and 'with development' cases for the assessment years 2024, 2028, 2032, 2040 and 2050 in three future scenarios (upper emission, central emission, and lower emission scenarios) are shown in **Figure 7.3**.

Figure 7.3 Surface access GHG emission forecasts (passenger and staff) for the 'without development' case (dashed line) and 'with development' cases (solid line) in all future improvement emission scenarios.



- 7.10.12 Surface access GHG emissions associated with the 'with development' case, relative to the 2019 baseline, describes the impact of future surface access activities by passengers and staff at LLA, including the surface access emissions associated with the Proposed Scheme.
- 7.10.13 Relative to the 2019 baseline, surface access GHG emissions in the 'with development' case decrease in all future scenarios. This is due to improved public transport targets, anticipated market trends regarding uptake of electric vehicles and efficiency improvements in transport modes (see **Section 7.9**) that have been embedded into the GHG assessment.
- 7.10.14 In 2050, surface access GHG emissions in the 'with development' case are reduced compared to the 2019 baseline value in all future improvement emissions scenarios. In 2050, surface access GHG emissions from the 'with development' case are 30.6 – 265.7 ktCO<sub>2e</sub>/yr. This represents a 140.0 – 375.2 ktCO<sub>2e</sub>/yr reduction relative to the 2019 baseline, equivalent to a 35% - 92% reduction in surface access GHG emissions. The difference between the scenarios is due to the relative lack of low/zero carbon cars in the upper emissions scenario.
- 7.10.15 The reduction in surface access GHG emissions is primarily driven by increases in electric vehicle usage, and fuel efficiency improvements in vehicles and rail travel. Additionally, the embedded surface access measures regarding uptake of public transport methods have been included where possible.



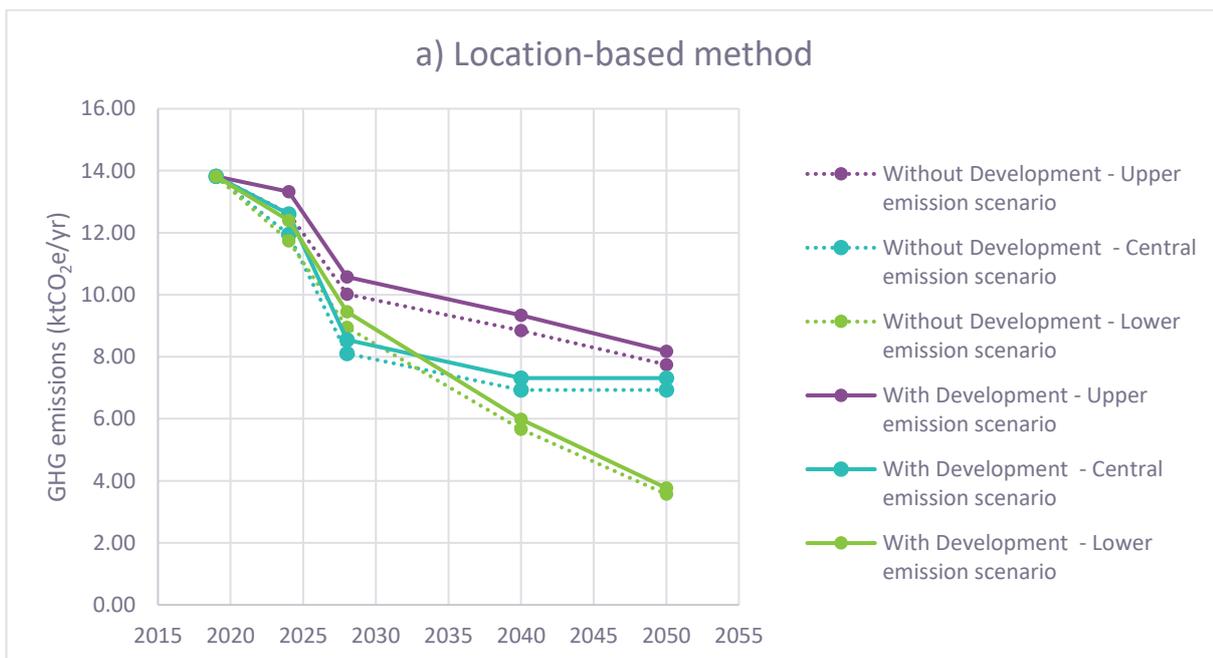
7.10.16 Modal shifts to increased public transport share are modelled until 2024, which is for when the targets in the Travel Plan are set. Further reductions in future years would also be expected, so the GHG emissions presented for 2028, 2032, 2040 and 2050 are likely to be conservative.

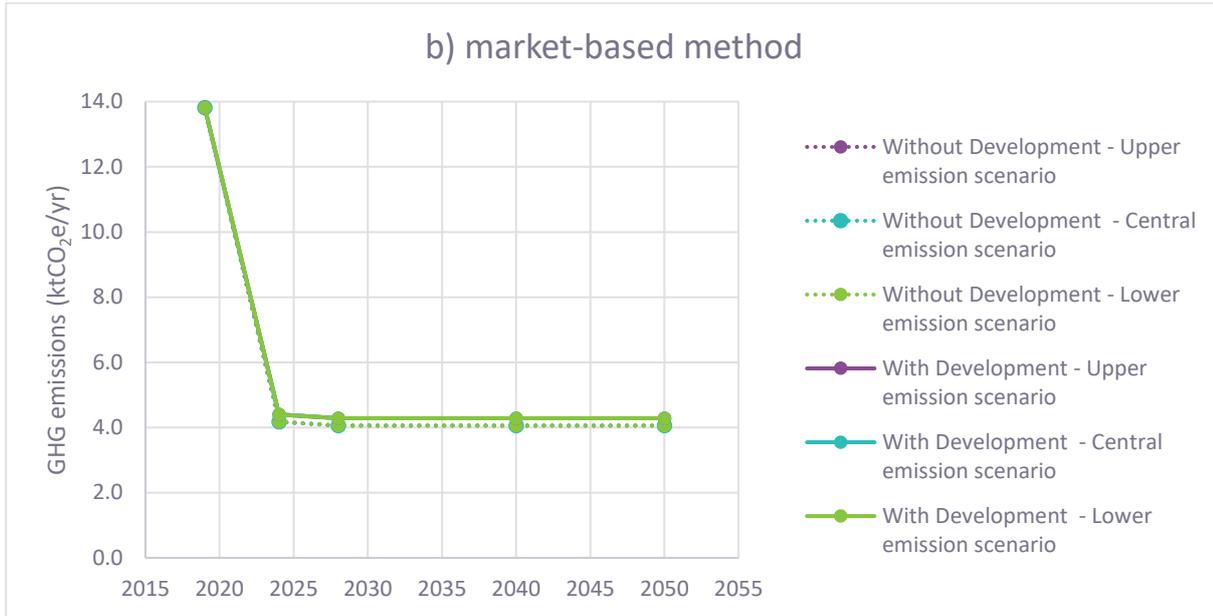
### Airport buildings and ground operations

7.10.17 In line with the GHG protocol<sup>81</sup> and BEIS guidance<sup>102</sup>, and as described in **Appendix 7A** in **Volume 3: Figures and appendices**, both location-based and market-based carbon reporting methods have been used to calculate projected GHG emissions associated with Scope 2 electricity (**Figure 7.4**). Baseline and projected airport building and ground operation GHG emissions are shown in **Figure 7.4**. Data is available in **Appendix 7A** in **Volume 3: Figures and appendices**.

7.10.18 The location-based method reflects the average emissions intensity of the UK grid network, while the market-based method reflects emissions associated with the procurement of entirely renewable sources that has been purposefully chosen at LLA.

Figure 7.4 Total airport building and ground operation GHG emissions forecasts for the 'without development' case (dashed line) and 'with development' case (solid line) in all future improvement emission scenarios: (a) location-based method and (b) market-based method for reporting





- 7.10.19 Relative to the 2019 baseline, airport building and ground operation GHG emissions in the 'with development' case decrease in all scenarios when either the location-based method or the market-based method is considered. This is driven by LLA's commitment to reduce operational electricity demand (excluding vehicles) to less than 2.0 kWh/pax by the end of 2023 and to generate at least 25% of electricity demand from on-site renewables by 2026.
- 7.10.20 The difference in airport building and ground operation GHG emissions between the two calculation methods is driven by LLA's commitment to purchase renewable electricity by the end of 2021.
- 7.10.21 Using the location-based method, in 2050, airport building and ground operation GHG emissions from the 'with development' case are 3.8 – 8.2 ktCO<sub>2e</sub>/yr. Using the market-based method, in 2050, airport building and ground operation GHG emissions from the 'with development' case are 4.1 – 4.3 ktCO<sub>2e</sub>/yr.

## 7.11 Assessment of effects: the global climate

- 7.11.1 As described in **Section 7.7** the only receptor for the climate assessment is the global climate, which is a highly sensitivity receptor. All increases in GHG emissions to the atmosphere are considered negative, direct, and permanent effects.
- 7.11.2 The magnitude of the GHG emissions from the Proposed Scheme is assessed based on the tests described in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**.

### Aviation Emissions

- 7.11.3 This sub-section considers the following magnitude test:

***The extent to which the scheme materially affects the ability of the UK to meet the aviation 'planning assumption'.***

The scale of international aviation GHG emissions in the 'with development' case is contextualised within the current UK 'planning assumption' for international aviation of 37.5 MtCO<sub>2</sub><sup>66</sup>. The CCC '

Pathway' value for GHG emissions from the aviation sector of 23 MtCO<sub>2e</sub><sup>69</sup>, which is not current Government policy, is also considered as a sensitivity assessment.

### International aviation GHG emissions from the Proposed Scheme

7.11.4 The difference in GHG emissions between the 'with development' case and the 'without development' case in each assessment year describes the impact of the activities associated with the Proposed Scheme only. The international aviation GHG emissions associated with the Proposed Scheme (i.e. expanding from 18 to 19 mppa) as a percentage of 37.5 MtCO<sub>2</sub>/yr planning assumption are shown in **Figure 7.5**.

Figure 7.5 International aviation GHG emissions from the expansion of LLA (i.e. the Proposed Scheme only) as a proportion of the 37.5 MtCO<sub>2</sub>/yr planning assumption.



7.11.5 The aviation forecasts for the 'with development' case include a more rapid fleet transition to the latest generation of aircraft than the 'without development' case. For this reason, emissions associated with the Proposed Development in 2028 are negative as the 'without development' case is forecast to have higher international aviation emissions.

7.11.6 At their peak in 2032 under all scenarios, the international aviation GHG emissions associated with the Proposed Scheme itself (i.e. the increase from 18 to 19 mppa) are projected to equate to 0.06% of the 37.5 MtCO<sub>2</sub>/yr planning assumption.

### International aviation GHG emissions from the whole airport

7.11.7 Baseline international aviation GHG emission from flights departing the UK in 2018 were 36.7 MtCO<sub>2</sub><sup>104</sup>. 2019 data is not yet available for the UK, but estimates suggest international aviation increased by 1.7%, such that the 2019 baseline is estimated to be 37.3 MtCO<sub>2</sub>. Based on the estimated 2019 UK total for international aviation, international aviation emission from LLA as a whole in 2019 (i.e. 18 mppa) represented 2.77% of the UK total.<sup>124</sup>

<sup>124</sup> Data showing international aviation UK totals only for 2019 is anticipated to be released in early 2021.



- 7.11.8 Dependent on the scenario used, total international aviation emissions from LLA in the 'with development' case in 2050 (i.e. 19 mppa) represent 1.85 – 2.18% of the planning assumption (**Figure 7.6**). Therefore, it can be determined that the share of UK emissions from LLA is unlikely to increase compared to its share in the baseline and is therefore unlikely to materially affect the ability of the UK to meet the planning assumption<sup>125</sup>.

Figure 7.6 International aviation GHG emissions from the 'with development' case, representing all international aviation emissions from an expanded LLA (including the Proposed Scheme) as a 'share' of the 37.5 MtCO<sub>2</sub>/yr planning assumption. LLA's 2019 (i.e. 18 mppa) 'share' of estimated baseline international aviation GHG emissions from flights departing the UK in 2019 is shown for reference.



#### Sensitivity analysis for all aviation emissions at London Luton Airport

- 7.11.9 Achieving the aviation sector target of 23 MtCO<sub>2</sub>e/yr in 2050 in the CCC's 'Balanced Pathway' scenario requires additional aviation policy implementation. Policy recommendations have been made by the CCC in the Sixth Carbon Budget report and have been used to create a fourth future scenario for the sensitivity assessment. This is shown alongside the upper, central, and lower emission scenarios in this sensitivity assessment.
- 7.11.10 The aviation GHG emissions associated with the Proposed Scheme (i.e. the increase from 18 to 19 mppa) as a percentage of the 23 MtCO<sub>2</sub>/yr suggestion are shown in **Figure 7.7**.

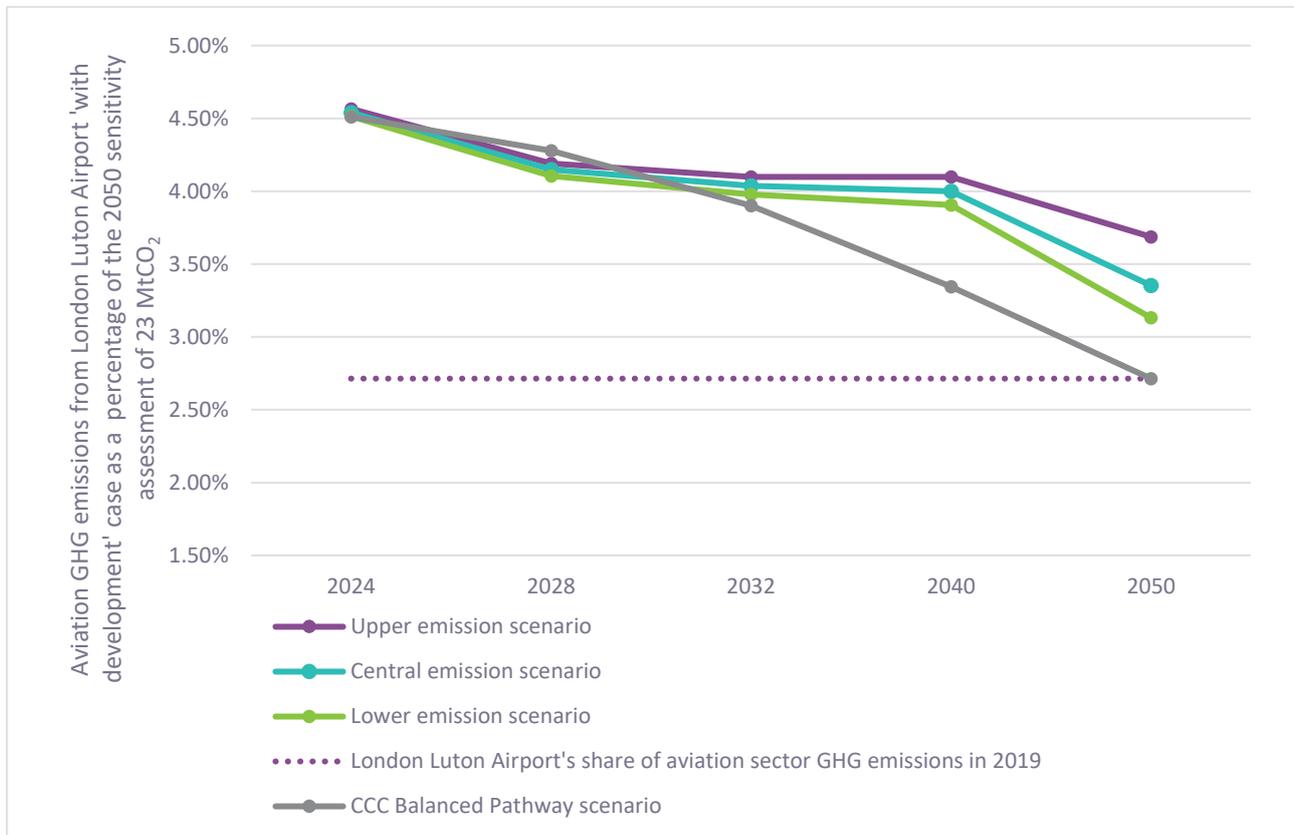
<sup>125</sup> There is no specific requirement for a particular airport to maintain a 'share' of the UK total. This metric is used to inform the assessment of GHGs of this Proposed Development against the 'planning assumption' but does not predicate that maintaining any particular airport's existing share in the future is a requirement for expansion.

Figure 7.7 Aviation GHG emissions from the expansion of LLA (i.e. the Proposed Scheme only) as a proportion of the 23 MtCO<sub>2e</sub>/yr planning suggestion.



- 7.11.11 Aviation GHG emissions associated with the Proposed Scheme itself peak in 2032, at which point they are projected to equate to a maximum of 0.10% of the 23 MtCO<sub>2e</sub>/yr suggestion. This reduces to 0.07% in 2050, in the CCC's 'Balanced Pathway' scenario.
- 7.11.12 Dependent on the scenario used, total aviation emissions from LLA in the 'with development' case in 2050 represent 3.13 to 3.69% of the 23 MtCO<sub>2</sub> suggestion in the upper, central, and lower emission scenario. In the more ambitious scenario, which includes additional policy implementation as suggested by the CCC in the 'Balanced Pathway' scenario, by 2050 LLA's share of the 23 MtCO<sub>2e</sub>/yr suggestion is 2.71% which is equal to its 2019 share of actual emissions (**Figure 7.8**).
- 7.11.13 Therefore, it can be determined that given national and aviation sector ambition and associated implementation of aviation policy, the share of aviation emissions from LLA is unlikely to increase compared to the baseline even if the CCC suggestion were brought into policy.

Figure 7.8 Aviation GHG emissions from the 'with development' case, representing all aviation emissions from an expanded LLA (including the Proposed Scheme) as a 'share' of the 23 MtCO<sub>2</sub>/yr planning suggestion. LLA's 2019 (i.e. 18 mppa) 'share' of actual baseline aviation sector GHG emissions from flights departing the UK in 2019 is shown for reference.



7.11.14 If the UK Government accepts the reduced aviation sector budget when setting the UK's sixth carbon budget in 2021, then further measures such as those suggested by the CCC<sup>69</sup> will need to be put in place through legal mechanisms and policy drivers to assist with emission reductions across the aviation sector. These measures are beyond LLA's control but would need to be taken into account when considering the extent to which the Proposed Scheme materially affects the Government's ability to achieve any such future policy position.

## Summary

7.11.15 Given that there is a projected long-term increase in international aviation GHG emissions in the 'with development' case compared to the 'without development' case, there is a residual adverse impact on the global climate. However, as the Proposed Development represents only 0.05 – 0.06% of the 37.5 MtCO<sub>2</sub>/yr 'planning assumption', and LLA's total share of UK international aviation GHG emissions in the 2050s is less than it is in the 2019 baseline, it is very unlikely that the Proposed Development will materially affect the ability of the UK to meet the 37.5 MtCO<sub>2</sub>/yr 'planning assumption'.

## UK Carbon Target for 2050 and UK Carbon Budgets (non-international aviation)

7.11.16 This sub-section considers the following magnitude test:

### ***The extent to which the scheme affects the ability of the UK to meet its target and budgets.***

The scale of the GHG emissions from all sources except international aviation in the 'With Development' case is contextualised within their overall impact on the UK Government's UK carbon

target of 'net zero' in 2050 and UK carbon budgets<sup>65,66</sup>. The scale of the GHG emissions from all sources except aviation in the 'With Development' case is also considered within the context of local objectives for reducing GHG emissions. Therefore, the extent to which the Proposed Development affects the ability of Luton Borough Council to meet its climate change objectives for a carbon neutral area by 2030<sup>79</sup> is taken into account. However, as the local objectives are not yet part of local planning policy, they are given less weight than the national Net Zero target<sup>65</sup> and the associated budgets in this magnitude test<sup>66</sup>.

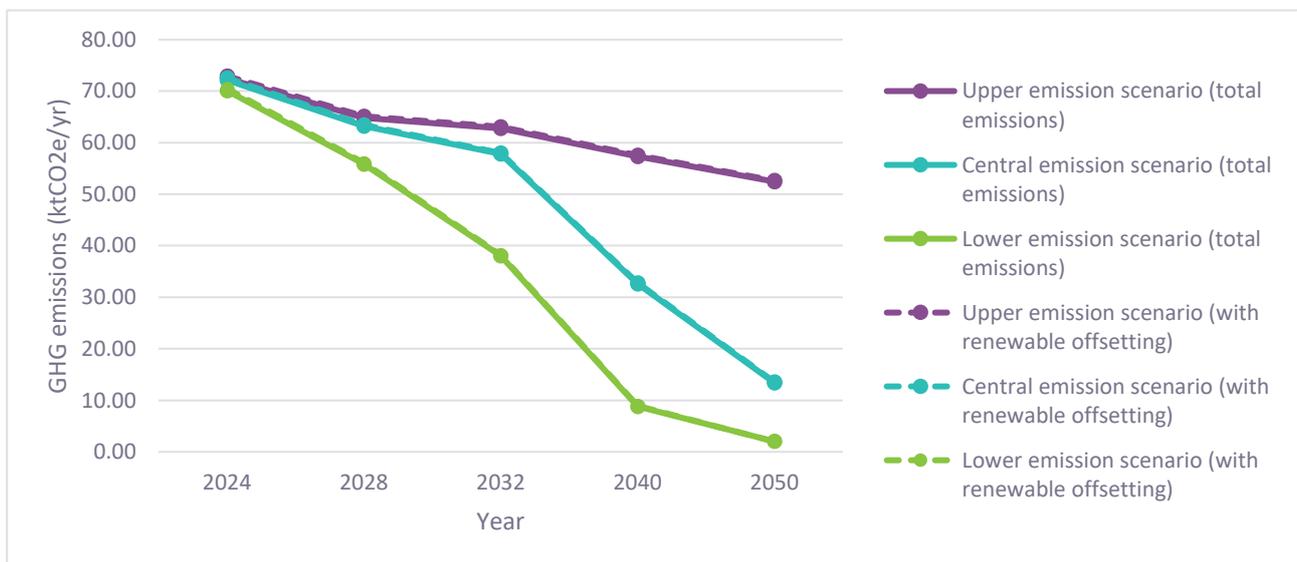
7.11.17 The following GHG emissions sources are considered for this magnitude test:

- Airport buildings and ground operations;
- Surface access; and
- Domestic aviation (Landing and Take-Off (LTO) and climb, cruise and descent (CCD) phases).

7.11.18 The difference in GHG emissions between the 'with development' case and the 'without development' case in each assessment year describes the impact of the activities associated with the Proposed Scheme only. **Figure 7.9** shows the projected GHG emissions that are considered in the UK Carbon Target<sup>65</sup> and UK Carbon Budgets<sup>66</sup>. Both the total emissions and residual emissions following offsetting commitments are shown.

7.11.19 At the peak in 2024, GHG emissions for this magnitude test from the Proposed Scheme are 70.1 – 72.5 ktCO<sub>2e</sub>/yr depending on the future scenario considered.

Figure 7.9 Total GHG emissions (solid line) and residual GHG emissions once offsetting commitments for renewable electricity supply are considered (dashed line) which contribute to the UK Carbon Target and UK Carbon Budgets from the Proposed Scheme only.



7.11.20 In 2050 GHG emissions from the Proposed Scheme that are considered in the UK Net Zero 2050 Target are between 2 – 52.6 ktCO<sub>2e</sub>/yr, dependent on the scenario used. Offsetting commitments have a negligible impact.

7.11.21 The residual GHG emissions in 2050 relate to the following sources:

- Surface access GHG emissions to and from the airport by passengers and staff. This accounts for the large range between scenarios, with the higher emissions scenario representing a slower

transition to low emissions vehicles compared to the other scenarios. These emissions require a coordinated approach with local authorities to reduce.

- Emissions from airport building and ground operations. Some of these emissions relate to Scope 3 activities that require a coordinated approach with partners on-site to reduce.
- A small amount of energy related to electricity transmission that remains in the bought renewable electricity factor.
- 2024 GHG emissions are assumed to be representative of the fourth carbon budget period (2023-2027)<sup>66</sup>. The total carbon budget for the UK in this period is 1,950,000 ktCO<sub>2e</sub>/yr. The percentage of this budget associated with the Proposed Scheme is 0.018 - 0.019%.

- 7.11.22 2028 and 2032 GHG emissions are assumed to be representative of the fifth carbon budget period (2028-2032)<sup>66</sup>. The total carbon budget for the UK in this period is 1,725,000 ktCO<sub>2e</sub>/yr. The percentage of this budget associated with the Proposed Scheme is 0.014 - 0.019%.
- 7.11.23 The Luton Borough Council Climate Change Action Plan<sup>79</sup> aims for a carbon neutral borough by 2040. To date, this is an aim rather than a policy and the scope of this aim has not yet been defined. In 2040, relevant GHG emissions associated with the Proposed Scheme are 8.9 – 57.6 ktCO<sub>2e</sub>/yr.
- 7.11.24 The residual GHG emissions from airport buildings and operations assessment and journeys to and from the Airport will require further mitigations or offsetting in order to not affect the ability of the UK Government to meet its 2050 net zero target. LLAOL has committed to work with Government, LBC and other stakeholders to develop their approach to becoming a net zero airport and will continue to monitor, report and review targets beyond 2024 through annual corporate reporting. A majority of the residual GHG emissions are Scope 3 emissions and are therefore not controlled by LLAOL.
- 7.11.25 The mitigations required to achieve LLAOL's net zero aim will be detailed in a Carbon Reduction Plan, which will include emissions reduction targets. The Carbon Reduction Plan will set out the roadmap for achieving a net zero airport for Scope 1 and 2 emissions, as well as indicating the approaches by which LLAOL can influence Scope 3 emissions. An outline version of the Carbon Reduction Plan will be produced during the consideration of this ES, and ahead of the determination of the planning application. Further details are described in **Section 7.13**.

## Summary

- 7.11.26 On the basis of the commitment to produce a Carbon Reduction Plan, the scale of GHG emissions from the Proposed Scheme are such that they will have a negligible effect on the ability of the UK to meet its carbon targets. Additionally, the scale of GHG emissions from the Proposed Scheme are such that they are unlikely to affect the ability of Luton Borough Council to meet its carbon neutral borough aim.

## Summary of predicted effects

- 7.11.27 The overall assessment of effects is based on the sensitivity of the receptor and magnitude of the GHG emissions as described in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**.
- 7.11.28 The global climate is the largest inter-related cumulative environmental effect<sup>83</sup>, so the receptor can be considered highly sensitive.
- 7.11.29 The overall effect of GHGs associated with the Proposed Scheme is based on the magnitude tests set out in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**. An assessment of projected GHG emissions associated

with the Proposed Scheme against these tests is set out in each of the sub-sections in **Section 7.11**. To summarise:

- For international aviation emissions, the 'with development' case represents 1.85 – 2.18% of the planning assumption of 37.5 MtCO<sub>2</sub>/yr in 2050. This is less than LLA's share of actual baseline international aviation GHG emissions from flights departing the UK in 2019 (2.82%). The GHG emissions associated with the Proposed Scheme itself are 0.05 – 0.06% of the 37.5 MtCO<sub>2</sub>/yr planning assumption in 2050.
- For all other GHG emissions, residual emissions associated with the Proposed Scheme (i.e. the increase in emissions between the 'with development' and 'without development' case), once offsetting commitments have been considered, are 1.99-52.64 ktCO<sub>2e</sub>/yr.
- Most of the residual emissions are Scope 3 and are thus not under the control of LLA.

7.11.30 The mitigations set out in **Section 7.8**, show that the GHG emissions associated with the Proposed Scheme have been mitigated wherever practicable, with a further commitment to producing a Carbon Reduction Plan as described in further detailed in **Section 7.13**. The Carbon Reduction Plan will be required to set out the ambition and actions required for ensuring LLA's Scope 1 and 2 emissions are in-line with the UK net zero 2050 target, and how LLA will use its influence to reduce Scope 3 emissions where possible.

7.11.31 LLAOL is committed to annually reporting its GHG emissions through annual carbon footprinting, which is publicly available.

7.11.32 Therefore, the Proposed Scheme:

- Is very unlikely to materially affect the ability of the UK Government to meet the 37.5 MtCO<sub>2</sub>/yr 'planning assumption' for UK international aviation GHG emissions in 2050.
- Is unlikely to materially affect the ability of the UK Government to meet its carbon targets for net zero in 2050, on the basis that a Carbon Reduction Plan is produced.
- Is unlikely to materially affect the ability of Luton Borough Council to meet its carbon neutral borough by 2040 aim, on the basis that a Carbon Reduction Plan is produced.
- Is consistent with the National Planning Policy Framework (NPPF)<sup>76</sup> requirement for developments to 'support the transition to a low carbon future in a changing climate', on the basis that a Carbon Reduction Plan is produced.

7.11.33 Given the magnitude criteria shown in **Table 7.7**, the Proposed Scheme is considered to have **a low GHG emissions magnitude**.

7.11.34 Following the approach set out in **Table 7.8**, the overall effect of projected GHGs associated with the Proposed Scheme on the global climate is considered **minor adverse**, and therefore **not significant** based on the commitment for further mitigations.

7.11.35 A sensitivity assessment for a lower international aviation GHG emissions 'headroom' has been carried out, in which the 2050 GHG emissions from LLA would still represent a reduced share of total UK emissions than in the 2019 baseline.

## 7.12 Assessment of cumulative effects

7.12.1 The assessment described in this ES chapter is effectively cumulative in nature, and thus a separate cumulative effects assessment is not required.

- 7.12.2 The assessment in this chapter can be regarded as a cumulative assessment as the national and local GHG emissions budgets and targets used for contextualisation are in place regardless of future trends such as airport development and demand change, technology development and population change. Therefore, it has not been necessary to carry out a separate cumulative effects assessment of GHG emissions as part of this ES.

## 7.13 Consideration of additional mitigation

- 7.13.1 The assessment set out above has concluded that it will be necessary to implement further mitigation measures to reduce residual GHG emissions. These additional measures have not been assessed as part of the Proposed Scheme.
- 7.13.1 This section sets out the measures to mitigate emissions that are not quantifiable within the calculation detailed in **Section 7.10**. They represent strategic commitments made by LLAOL with regards to emissions reduction.
- 7.13.2 A Carbon Reduction Plan will be produced which will set out the roadmap for achieving a net zero airport for Scope 1 and 2 emissions, as well as indicating the approaches by which LLAOL can influence Scope 3 emissions. An outline version of the Carbon Reduction Plan will be set out ahead of the determination of the planning application by LBC.
- 7.13.3 LLAOL's continued engagement with Sustainable Aviation and commitment to reach the advanced levels of certification within the Airport Carbon Accreditation Scheme shows leadership in airport sustainability that will feed into future carbon management activities.

### Airport building and ground operations

- 7.13.4 Through the Responsible Business Strategy<sup>118</sup>, LLAOL has committed to being aligned with the UK net zero target for 2050. LLAOL has therefore committed to develop a Carbon Reduction Plan, which will set out the ambition and actions required for ensuring LLA's Scope 1 and 2 emissions are in-line with the UK net zero 2050 target. An outline version of the Carbon Reduction Plan will be produced during consideration of the ES, and ahead of determination of the planning application. The full version would be provided following planning approval, as a time-bound condition of the planning permission. This forms part of the wider commitment to reaching more ambitious levels of certification within the Airport Carbon Accreditation Scheme, which would ultimately result in carbon neutral operations.
- 7.13.5 The Carbon Reduction Plan will also set out the approaches by which LLAOL can influence the reduction of Scope 3 emissions, including on-site stakeholders such as airside partners, hotels, retail etc.

### Surface access

- 7.13.6 Most of the residual emissions in 2050 relate to surface access associated with the Proposed Scheme. LLAOL has committed to surface access targets for reducing non-electric private car journeys from passengers and non-electric single occupancy trips by staff by 2024 in the Travel Plan. These have not been incorporated in the surface access assessment due to uncertainties in future projections. It is therefore anticipated that surface access emissions in the 'with development' case will be lower than those presented in **Section 7.10** of this report due to improvements in sustainable surface access driven by further targets set by LLAOL.
- 7.13.7 LLAOL have committed to develop their approach to becoming a net zero airport through the production of a Carbon Reduction Plan. This will include identifying the approaches by which LLAOL can influence the reduction of Scope 3 emissions, including surface access. Key stakeholders,

including local authorities and transport providers, will be engaged in the development of the Carbon Reduction Plan.

- 7.13.8 LLAOL will continue to monitor, report and review targets beyond 2024 through the Surface Access Strategy monitoring process.

## Aviation emissions

- 7.13.9 LLAOL have committed to develop their approach to becoming a net zero airport through the production of a Carbon Reduction Plan. This will include identifying the approaches by which LLAOL can influence the reduction of Scope 3 emissions, including surface aviation. Key stakeholders, including local authorities, aviation sector organisations and airlines, will be engaged in the development of the Carbon Reduction Plan.

## 7.14 Conclusions of significance evaluation

- 7.14.1 The only receptor for the GHG assessment is the global climate, which is a highly sensitive receptor due to the global impacts of climate change. All increases in GHG emissions to the atmosphere are considered negative, direct, and permanent effects.
- 7.14.2 The magnitude of the GHG emissions from the Proposed Scheme is assessed based on the tests described in **Section 7.9**, sub-section **Methodology for assessing overall effect of GHG emissions associated with the Proposed Scheme**.
- 7.14.3 For international aviation GHG emissions, LLA's 'share' of the UK planning assumption of 37.5 MtCO<sub>2</sub>/yr in 2050 is less than the 'share' of emissions it had in the 2019 baseline. Furthermore, the emissions from the Proposed Scheme itself are only 0.05 – 0.06% of the planning assumption. Therefore, it is considered highly unlikely that the Proposed Scheme will materially affect the ability of the UK to meet the 37.5 MtCO<sub>2</sub>/yr planning assumption.
- 7.14.4 For all other GHG emissions, there is an increase in projected GHG emissions associated with the Proposed Scheme case (i.e. the 'with development' case relative to the 'without development' case) in 2050. Residual Scope 1 and 2 emissions require to be further reduced to net zero by 2050 through the additional mitigations described in **Section 7.13**, including the Carbon Reduction Plan. The Carbon Reduction Plan will also set out how LLAOL will influence the reduction of Scope 3 emissions, for example by working with on-site partners, transport providers, local authorities, and airlines. Given the commitment to produce a Carbon Reduction Plan, it is considered unlikely that the Proposed Scheme will materially affect the ability of the UK to meet its carbon target for net zero by 2050, as legislated in the Climate Change Act<sup>65</sup>.
- 7.14.5 Given the magnitude criteria shown in **Table 7.7**, and assessed in **Section 7.11** and the enactment of the further mitigations in **Section 7.13**, the Proposed Scheme is considered to have **a low GHG emissions magnitude**.
- 7.14.6 Following the approach set out in **Table 7.8**, the overall effect of GHGs associated with the Proposed Scheme on the global climate is considered **minor adverse** and therefore **not significant**.

## 7.15 Implementation of environmental measures

- 7.15.1 **Table 7.10** describes the environmental measures embedded within the Proposed Scheme and the means by which they will be implemented, i.e. they will have been secured through the planning conditions.

Table 7.10 Summary of environmental measures to be implemented – relating to climate

Environmental measure	Responsibility for implementation	Compliance mechanism	ES section reference
Carbon Reduction Plan	LLAOL	Subject to a time-bound planning condition	<b>7.11, 7.13</b>
Achieving objectives and targets relating to surface access as set out in the Travel Plan	LLAOL	ASAS monitoring	<b>7.8</b>
<b>Monitoring, reporting, and reviewing targets relating to surface access through the Surface Access Strategy monitoring process.</b>	LLAOL	ASAS monitoring	<b>7.8</b>
Scope 1 and 2 improvements as set out in the Responsible Business Strategy 2020-2025	LLAOL	Annual monitoring report	<b>7.8</b>
<b>Achieving further levels in Airport Carbon Accreditation Scheme</b>	LLAOL	Annual monitoring report	<b>7.8</b>