CITY AIRPORT DEVELOPMENT PROGRAMME
(CADP1) S73 APPLICATION

ENVIRONMENTAL STATEMENT

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City Airport Development Programme (CADP1) S73 Application

Volume 1: Environmental Statement
Chapter 11: Climate Change

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11 Climate Change

11.1 Introduction

11.1.1 This chapter was prepared by Ecolyse Limited and Air Quality Consultants, and presents an assessment of the likely significant effects of the proposed development on Climate Change.

11.1.2 The assessment is presented in two parts:

- Part A presents the effect of the proposed development on climate change through an assessment of the proposed development's Greenhouse Gas (GHG) footprint and determines its significance in the context of national and local climate change policy. It also reports on the in-combination effects of future climate change on the GHG assessment. The GHG footprint includes emissions from both the **construction** and **operational** phases of the proposed development. Operational emissions cover emissions from **aircraf**t (e.g. in flight and on the ground) and from **airport** sources, which include emissions from the airport and third party use of energy and fuel, from ground transport, and from construction; and
- Part B presents an assessment of the effect of climate change on the proposed development in terms of its resilience to future changes to climate.

11.1.3 This chapter should be read in conjunction with the following appendices:

- Appendix 11.1 – GHG Assessment Methodology;
- Appendix 11.2 – Detailed GHG Assessment Results; and
- Appendix 11.3 – Outline Climate Change and Carbon Action Plan (CCCAP).

11.2 Policy and Legislative Context[1]

Legislation

11.2.1 The following legislation is relevant to the assessment of climate change.

Table 11-1 Legislation relevant to the climate change assessment

Legislation	Summary of Relevance to the Proposed Development
The Paris Agreement[2] and **UK Nationally Determined Contributions**[3]	The Paris Agreement is a legally binding international treaty within the United Nations Framework Convention on Climate Change (UNFCCC) dealing with GHG emissions mitigation, adaptation and finance starting in the year 2020. It requires all signatories to declare their Nationally Determined Contributions (NDC) towards balancing anthropogenic sources and sinks of GHGs in the second half of this century with the objective of keeping global warming to well below 2°C and to pursue efforts to limit global warming to 1.5°C. Since its withdrawal from the EU, the UK Government declares its own NDC setting out its climate change obligations under the Paris Agreement and the climate change target and budgets set under the Climate Change Act 2008. In 2020, the UK communicated its new NDC to the UNFCCC pursuant to the Paris Agreement. Within its latest NDC, the UK has committed to reducing GHG emissions by at least 68% by 2030 compared to 1990 levels. As such the NDC is set to directly align with carbon budgets. The GHG assessment (Part A of this assessment) has considered GHG emissions from the proposed development in the context of UK legislation (The Climate Change Act 2008) that has been developed in response to the Paris Agreement.
Climate Change Act (2008)[4] and **Climate Change Act 2008 (2050 Target**	The Climate Change Act (as amended in 2019) commits the UK to ensure that the net UK carbon account for the year 2050 is at least 100% lower than the 1990 baseline; this is usually referred to as 'net zero'. In meeting this target it requires the Government to establish 5-year carbon budgets having regard to the advice of the Committee on Climate Change (CCC).

[1] Reference is made throughout this section to airport and aircraft emissions. Airport emissions relate to all sources excluding those from aircraft. See also Table 11-7 which defines the scope of aircraft and airport emissions.

[2] United Nations (2015) Paris Agreement

[3] UK Government (2020) United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contributions

[4] Her Majesty's Stationery Office, 2008. Climate Change Act 2008.

Legislation	Summary of Relevance to the Proposed Development
Amendment) Order 2019[5]	Emissions arising from international aviation and shipping were not included in the first five carbon budgets set under the Climate Change Act, although those carbon budgets were set 'having regard to emissions from international aviation (and international shipping) based on advice from the CCC. The 6th carbon budget does, however, include emissions from international aviation and shipping. Emissions from domestic aviation are included in all carbon budgets. The Climate Change Act also requires the UK Government to produce a UK Climate Change Risk Assessment (CCRA) every five years. The CCRA assesses current and future risks to and opportunities for the UK arising from climate change. In response to the CCRA, the Climate Change Act also requires the UK government to produce a National Adaptation Programme (NAP) to address climate risks. The NAP covers England, while the devolved administrations produce their own programmes and policies. The GHG assessment (Part A of this assessment) has considered GHG emissions with and without the proposed development in the context of the UK's 2050 net zero target and carbon budgets. Part B, Resilience to Climate Change has considered potential climate risks and adaptation measures.
4th Carbon Budget[6]	The 4th carbon budget sets the budget for the period 2023-2027 and was set at 1,950 million tonnes CO_2e excluding international aviation and shipping (but including domestic flights and shipping). In excluding emissions from international aviation and shipping it took into account the CCC's 'planning assumption' (i.e. for UK international and domestic aviation emissions to not exceed 37.5MT of CO_2 by 2050). The GHG assessment (Part A of this assessment) compares the emissions of the airport with and without the proposed development against the 4th carbon budget. Aircraft emissions with and without the proposed development during the 4th carbon budget are also compared to the CCC's "planning assumption".
5th Carbon Budget[7]	The 5th carbon budget, was introduced in 2016 and sets the budget for the period 2028-2032. The 5th carbon budget was set at 1,725 million tonnes CO_2e excluding international aviation and shipping (but including domestic flights and shipping). In excluding emissions from international aviation and shipping it took into account the CCC's 'planning assumption' (i.e. for UK international and domestic aviation emissions to not exceed 37.5MT of CO_2 by 2050). The GHG assessment (Part A of this assessment) compares the emissions of the airport with and without the proposed development against the 5th carbon budget. Aircraft emissions with and without the proposed development during the 5th carbon budget are also compared to the CCC's "planning assumption".
6th Carbon Budget[8]	In June 2021, the UK Government made the 6th carbon budget, in line with the recommendation of the CCC. The budget for the years 2033-2037 is 965 million tonnes CO_2e, and includes international aviation and shipping. The GHG assessment (Part A of this assessment) compares the emissions from the airport with and without the proposed development against the 6th carbon budget. Aircraft emission with and without the proposed development are also compared against the 6th Carbon budget.
The Town and Country Planning (Environmental Impact Assessment) Regulations 2017[9]	Schedule 4, Regulation 18(3) (Information for Inclusion in Environmental Statements) refers to 'climate' in the following ways: *"A description of the factors specified in regulation 4(2) likely to be significantly affected by the development… climate (for example greenhouse gas emissions, impacts relevant to adaptation)",* and: *"A description of the likely significant effects of the development on the environment resulting from, inter alia… the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change";* therefore, signalling that both the impact of climate change on the proposed development (including environmental receptors) and the impact of the proposed development on climate change, are to be considered. The Regulations set out the emissions sources to be considered in a GHG assessment.

[5] Her Majesty's Stationery Office, 2019. The Climate Change Act 2008 (2050 Target Amendment) Order 2019

[6] UK Government (2011) The Carbon Budget Order 2011

[7] UK Government (2016) The Carbon Budget Order 2016

[8] UK Government (2021) The Carbon Budget Order 2021

[9] 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/pdfs/uksi_20170571_en.pdf

Legislation	Summary of Relevance to the Proposed Development
	This assessment has considered both the potential impact of the project (in terms of changes in GHG emissions) on climate change (see Part A) and the project's vulnerability to climate change (See Part B).
The Greenhouse Gas Emissions Trading Scheme Order 2020[10] and **The Greenhouse Gas Emissions Trading Scheme (Amendment) (No. 2) Order 2022**[11]	The Greenhouse Gas Emissions Trading Scheme Order 2020 (as amended) provides the legislation which implements the UK Emissions Trading Scheme (UK ETS), as a replacement to the UK's participation in the EU ETS. The UK ETS is a cap-and-trade mechanism which includes aviation emissions. The aviation routes covered by the UK ETS include UK domestic flights, flights between the UK and Gibraltar, and flights departing the UK to the European Economic Area conducted by all included aircraft operators, regardless of nationality. Aircraft operators covered by the UK ETS need to surrender a greenhouse gas emission permit for each tonne of CO_2e emitted in a year and have obligations to comply with the conditions in their Environmental Management Plan and monitor their aviation emissions each year. In 2021, the UK Government consulted on how the UK ETS will integrate with wider industry initiatives to reduce GHG emissions, including a proposed approach to implementing CORSIA in the UK[12]. As detailed below (see CORSIA) Government is progressing legislation to ensure consistency between CORSIA and the UK ETS[17]. The Greenhouse Gas Emissions Trading Scheme (Amendment) (No. 2) Order 2022 has recently been made (9th November 2022) and is due to come into force on the 1st January 2023. This provides further details on technical issues relating to the implementation of the UK ETS. Importantly government has signalled recently in its response to consultation on the UK ETS[13] that it plans to implement legislation to align the UK ETS cap for aviation with its net zero trajectory with a view to legislating during 2023 and for this to take effect in 2024. The Jet Zero Strategy (see further below) also sets out the government's commitment on aligning the UK ETS with its net zero trajectory. The assessment identifies the proportion of aircraft GHG emissions with and without the proposed development that would be subject to the UK ETS cap and would therefore be considered to be managed through government legislation consistent with meeting net zero.
The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021[14] and **The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) (Amendment) Order 2022 (SI 2022/1050)** [15]	The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021 came into force on 26 May 2021 and it implements the International Civil Aviation Organisation (ICAO) Carbon Offsetting Reduction Scheme for International Aviation (CORSIA)[16] in the UK and contains duties for aircraft operators, verification bodies and Regulators in the UK. CORSIA is a global market-based measure whereby offsetting is used to reduce sectoral emissions to agreed levels. Offsetting of CO_2 emissions in the aviation sector will be achieved through the acquisition and cancelation of emissions units from the global carbon market by aircraft operators. CORSIA imposes on aircraft operators' requirements to: 1) monitor, report and verify CO_2 emissions - operators with annual emissions over 10,000 tonnes of CO_2 are required to annually report their emissions for international flights only. 2) offset CO_2 emissions - from 2021, at the end of each 3-year compliance period, operators must demonstrate that they have met their offsetting requirements by cancelling the appropriate number of emissions units. On 18 January 2021, the Department for Transport (DfT) launched a consultation on implementing the CORSIA in the UK which closed on 28 February 2021. On 23rd June 2022 Government published its policy for the initial offsetting approach for CORSIA[17] including consideration of the interaction of CORSIA with the UK ETS through a draft 2022 order[18]. The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) (Amendment) Order 2022 (SI 2022/1050) came into force on the 9th November 2022. This instrument implements CORSIA offsetting in the UK, covering the applicability and calculation

[10] UK Government (2020) The Greenhouse Gas Emissions Trading Scheme Order 2020

[11] UK Government (2022) The Greenhouse Gas Emissions Trading Scheme Order 2022, no 1173

[12] Department for Transport (2021) Consultation outcome. Implementing the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA): UK government response

[13] A joint response from the UK Government, Scottish Government, Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland (2022), Developing the UK ETS: initial UK ETS Authority response covering proposals to be implemented by 2023

[14] UK Government (2021) The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2021

[15] UK Government (2022) The Air Navigation (Carbon Offsetting and Reduction Scheme for International Aviation) Order 2022

[16] ICAO (2019) Climate Change Mitigation: CORSIA

[17] See https://www.gov.uk/government/publications/initial-offsetting-approach-for-corsia-statement-of-intent/initial-offsetting-approach-for-corsia-statement-of-intent

[18] See https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1081320/the-air-navigation-carbon-offsetting-and-reduction-scheme-for-international-aviation-amendment-order-2022-draft-legislation.pdf

Legislation	Summary of Relevance to the Proposed Development
	of CO_2 offsetting requirements for the 2021 scheme year only. This is to ensure relevant legislation is in force before the deadline to calculate aeroplane operators' offsetting obligations for the 2021 scheme year on 30th November 2022, and thus ensuring the UK continues to uphold the requirements set by ICAO. This is a short-term measure while the Government considers the approach to any interaction between CORSIA and the UK Emissions Trading Scheme (UK ETS) on flights in scope of both schemes, Further secondary legislation will therefore be required to fully implement CORSIA's offsetting requirements and related enforcement provisions for the full duration of the scheme and to clarify any interaction between CORSIA and the UK ETS. The Government plans to consult again in due course, aiming to have all legislation for CORSIA and any consequential amendments that may be required to the UK ETS in force by the start of 2024. The GHG assessment (Part A of this assessment) identifies the proportion of aircraft GHG emissions arising with and without the proposed development that would be subject to CORSIA offsetting requirements (e.g not covered by the UK ETS).

National policy

11.2.2 The following National Policy is relevant to the assessment of climate change.

Table 11-2 National policy relevant to the climate change assessment

Policy	Summary of Specific Policies Relevant to the Proposed Development
Aviation Policy Framework (APF) (2013)[19]	The Aviation Policy Framework defines the Government's objectives and policies that apply to the UK's aviation sector. One of the main objectives of the framework is to ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions. The Framework recognises the role of the ICAO and the Advisory Council for Aeronautical Research in Europe (ACARE) for addressing the climate impacts of aviation. As climate change is a global issue and best tackled at the international level, the APF does not focus closely on the sustainability of airport ground operations, which represents a relatively small impact on climate change in comparison. Measures to minimise and mitigate the impacts of climate change from the proposed development are set out in this assessment.
Airport National Policy Statement (ANPS): new runway capacity and infrastructure at airports in the South East of England[20] (2018)	Whilst the Airports National Policy Statement (ANPS) does not *"have effect"* for the purposes of this application, Paragraph 1.41 makes it clear that *"the contents of the ANPS will be both important and relevant considerations in the determination of airport growth applications, particularly where they relate to London or the South East of England."* Specifically, Paragraph 5.82 specifies that: *"Any increase in carbon emissions alone is not a reason to refuse development consent, unless the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including carbon budgets."* The assessment of significance of any change in aircraft GHG emissions resulting from the proposed development has therefore been completed taking into account Paragraph 5.82 from the ANPS as a test of significance. The ANPS also sets out other guidelines for airport developers including the need to establish the degree to which emissions are covered by the traded sector – e.g. are subject to the UK ETS. In terms of the proposed development the emissions subject to the UK ETS include emissions from aircraft and to a less significant extent from electricity consumption since those are set to reduce to net zero based on the airport's net zero commitment. The degree to which aviation emissions are traded, e.g. subject to the UK ETS is considered in the assessment.
Beyond the horizon: The future of UK aviation, Making best use of existing runways (2018)[21]	This government policy statement is described in Chapter 5 of the ES: Planning Policy and Context. Specifically, on carbon emissions this policy states that:

[19] Department for Transport, Aviation Policy Framework 2013 found at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/153776/aviation-policy-framework.pdf

[20] Department for Transport (2018) Airport National Policy Statement: new runway capacity and infrastructure at airports in the South East of England

[21] DfT 2018, Beyond the horizon: The future of UK aviation, Making best use of existing runways, found at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714069/making-best-use-of-existing-runways.pdf

Policy	Summary of Specific Policies Relevant to the Proposed Development
	"*1.11 There are, however, some important environmental elements which should be considered at a national level. The government recognises that airports making the best use of their existing runways could lead to increased air traffic which could increase carbon emissions".* *1.22 The government recognises the impact on communities living near airports and understands their concerns over local environmental issues, particularly noise, air quality and surface access. As airports look to make the best use of their existing runways, it is important that communities surrounding those airports share in the economic benefits of this, and that adverse impacts such as noise are mitigated where possible.* *1.23 For the majority of local environmental concerns, the government expects these to be taken into account as part of existing local planning application processes.* *1.25 As a result of the consultation and further analysis to ensure future carbon emissions can be managed, government believes there is a case for airports making best of their existing runways across the whole of the UK. The position is different for Heathrow Airport where the government's policy on increasing capacity is set out in the proposed Airports NPS."* These statements therefore indicate that carbon emissions from aircraft emissions (i.e. "air traffic") are to be considered at a national level. The GHG assessment (Part A of this assessment) therefore considers the proposed development's aircraft emissions separately from its airport emissions in establishing their significance.
National Planning Policy Framework (2021)[22]	The NPPF sets out the Government's planning policies for England and how these should be applied, both in drawing up plans and making decisions about planning applications. Paragraph 152 states: *"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".* Paragraph 153 states that Local Planning Authorities: *"Should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure"* Paragraph 154 states that: *"New development should be planned for in ways that (…) can help to reduce greenhouse gas emissions, such as through its location, orientation and design."* Paragraph 155 states that: *"To help increase the use and supply of renewable and low carbon energy and heat, plans should:* *a) provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts);* *b) consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development; and* *c) In line with the objectives and provisions off the Climate Change Act 2008 identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for collocating potential heat customers and suppliers."* Paragraph 157 states that: "in determining planning applications, 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..."* Paragraph 188 states that *"The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively."* Part A of this assessment has explicitly considered the requirements of the NPPF, noting also that Paragraph 188 indicates that regimes for managing effects (e.g. UK ETS) can be assumed to operate effectively. Part B of this assessment has considered measures to adapt to future climate change.
Decarbonising Transport: A Better,	The Government's Decarbonising Transport Policy sets out the Government's commitments and actions to further decarbonise the full transport system in the UK before 2050. The strategic priorities included are modal shift and active transport; decarbonisation of road

[22] Department for Communities and Local Government. (2021). National Planning Policy Framework.

Policy	Summary of Specific Policies Relevant to the Proposed Development
Greener Britain (2021)[23]	transport; decarbonising the freight system; green transport technology and innovation; place-based solutions; and reducing carbon in the global economy. Government commitments that are expected to influence GHG emissions from the airport ground transport activities have been accounted for when estimating GHG emissions from ground transportation in both the Do Minimum (DM) and Development Case (DC) scenarios. These assumptions are described in Appendix 11.1. The Government's strategy has also been considered in the mitigation measures described in this assessment.
Net zero strategy: Build back greener (2021)[24]	The Government's Net Zero Strategy sets out a plan to keep the UK on track to meets its UK carbon budgets, 2030 Nationally Determined Contribution, and achieve net zero by 2050. It includes the Government's: ➢ decarbonisation pathways to net zero by 2050, including illustrative scenarios; ➢ policies and proposals to reduce emissions for each sector; and ➢ cross-cutting action to support the transition. The Net Zero Strategy will be submitted to the United Nations Framework Convention on Climate Change (UNFCCC) as the UK's second Long-Term Low Greenhouse Gas Emission Development Strategy under the Paris Agreement. The GHG assessment (Part A) has taken into account key government policies set out in the Net Zero Strategy for decarbonising the economy including the transport and power sectors both of which are relevant to the proposed development. Details on assumptions adopted are presented in Appendix 11.1.
Jet Zero Strategy (2022)[25]	The Government's Jet Zero Strategy confirms the Government's goal for UK aviation to be net zero by 2050. Underlying that goal is a CO_2e emissions reduction trajectory that sees UK aviation emissions peak in 2019. The trajectory from 2025 to 2050, is based on the DfT's "High Ambition" scenario, and sets ambitious in-sector targets of 35.4 $MtCO_2e$ in 2030, 28.4 $MtCO_2e$ in 2040, and 19.3 $MtCO_2e$ in 2050. The Strategy sets a strategic framework on how these targets can be met that is based around international leadership, delivering partnership and maximising opportunities around system efficiencies, Sustainable Aviation Fuels (SAFs), zero emissions flights, markets and removals, influencing consumers and addressing non-CO_2 emissions. The strategy sets out a comprehensive set of policies including 5 key policies as follows: ➢ Domestic flights net zero by 2040; ➢ SAF mandate with 10% SAF in the UK fuel mix by 2030; ➢ Airport operations in England zero emissions by 2040; ➢ Emissions trajectory from 2025 with target milestones at 2030 and 2040; and ➢ Implement CORSIA by 2024. Progress is monitored annually and the strategy updated every 5 years. Additionally, the Strategy targets implementing a UK ETS cap which is consistent with achieving net zero by 2050 and making any decisions on aviation free allocation policy and interaction with the future SAF mandate by 2025. Specifically, the Strategy commits to align the 'allowances' under the UK ETS with meeting the 6th carbon budget. Paragraph 3.46 of the Jet Zero Strategy says that: *"The UK Emissions Trading Scheme (UK ETS) covers all domestic flights in the UK as well as flights from the UK to the EEA, and to and from Gibraltar. This Strategy draws on UK ETS Authority proposals in the Developing the UK ETS consultation to increase the ambition of the scheme by aligning the cap with a clear net zero trajectory, and new carbon price assumptions which illustrate the potential costs faced by airline operators in future."* In setting ambitious targets, the Jet Zero Strategy (Paragraph 3.57) makes it clear that the Government continues to support sustainable airport growth: "*Our approach to sustainable growth is supported by our analysis (set out in the supporting analytical document) which shows that we can achieve Jet Zero without the Government needing to intervene directly to limit aviation growth. The analysis uses updated airport capacity assumptions consistent with the latest known expansion plans at airports in the UK. The analysis indicates that it is possible for the potential carbon emissions resulting from these expansion schemes to be accommodated within the planned trajectory for achieving net zero emissions by 2050, and consequently that our planning policy frameworks remain compatible with the UK's climate change obligations"*

[23] Decarbonising Transport: A Better, Greener Britain, Department for Transport, 2021

[24] HM Government (2021). Net Zero Strategy: Build Back Greener

[25] Department for Transport (2022) Jet Zero Strategy: Delivering net zero aviation by 2050

Policy	Summary of Specific Policies Relevant to the Proposed Development
	The Strategy is comprehensive and provides clear direction on how future airport growth can be consistent with UK climate policy. The Government is committing to the "High Ambition" scenario and has set policies to realise that ambition. The GHG assessment (Part A) has therefore adopted the same assumptions as the "High Ambition" scenario relating to the decarbonisation of UK aviation in the modelling of future aircraft GHG emissions, detailed further in Appendix 11.1. Emissions from aircraft are compared to the in-sector trajectory to inform the assessment of the proposed development's consistency with Paragraph 5.82 of the ANPS (see earlier discussion in this table on the ANPS) and the assessment of significance.

Regional policy

11.2.3 The following Regional Policy is relevant to the assessment of climate change.

Table 11-3 Regional policy relevant to the climate change assessment

Policy	Summary of Specific Policies Relevant to the Proposed Development
The London Plan (2021)[26]	The London Plan sets out the Mayor's spatial development strategy for London. Of particular relevance to greenhouse gas emissions, the London Plan describes that *"the Mayor is committed to London becoming a zero-carbon city*". It also explains that *"'Carbon' is used in the London Plan as a shorthand term for all greenhouse gases".* The London Plan also requires London Boroughs to ensure that all developments maximise opportunities for on-site electricity and heat production from solar technologies (photovoltaic and thermal) and use innovative building materials and smart technologies. This approach will reduce carbon emissions, reduce energy costs to occupants, improve London's energy resilience and support the growth of green jobs. The key policy relevant to the GHG assessment is Policy SI 2: Minimising greenhouse gas emissions, and Policy T8 Aviation. Specifically, T8 requires that: *"The aviation impacts on climate change must be fully recognised and emissions from aviation activities must be compatible with national and international obligations to tackle climate change. The implications for other sectors and other airports must also be fully understood when expansion proposals are brought forward, and aviation greenhouse gas emissions must be aligned with the Mayor's carbon reduction targets".* In terms of climate resilience, the key policies are Policy SI 4: Managing Heat Risk, Policy S1 12: Flood Risk Management. The GHG assessment (Part A) has considered the implications of the change in airport related GHG emissions (i.e. excluding aircraft) resulting from the proposed development in relation to Policy SI2. Consistency with Policy T8 is also examined. Part B Climate Resilience assessment has considered measures to adapt to future climate change.

Local policy

11.2.4 The following Local Policy is relevant to the assessment of climate change.

Table 11-4 Local policy relevant to the climate change assessment

Policy	Summary of Specific Policies Relevant to the Proposed Development
Newham Local Plan 2018[27]	The Newham Local Plan 2018 sets a number of policies relevant to climate change including SC1 on Environmental Resilience, and SC2 on Energy and Zero Carbon. Key relevant points include; summarised below: *Policy SC2: Energy and Zero Carbon.* *1. Strategic Principles:* *a. All development will minimise and reduce carbon emissions by following the lean, clean, green energy hierarchy; all major development will meet London Plan Zero Carbon targets; and* *b. Energy planning should contribute to the Council's Resilience agenda in relation to costs and service level in the ongoing provision of energy.*

[26] Mayor of London (2021): The London Plan: Special Development Strategy for Greater London, March 2021

[27] London Borough of Newham BC (2018): Newham Local Plan 2018: A 15 year plan looking ahead to 2033. 2018.

	2. Spatial Strategy: *a. The development and expansion of decentralised energy networks (including low-carbon generation, storage and transmission infrastructure) will be a central component of the scale of growth within the Arc of Opportunity; and* *b. Development should be configured to maximise the use of natural and waste energy sources including sunlight/daylight and (where feasible) ground / air / water / waste heat, where otherwise acceptable in terms of environmental impacts.* *3. Design and technical criteria:* *a. All development is encouraged to incorporate Smart Meter technology that allows occupants to monitor and manage their energy usage. Major development will be required to commit to carrying out post-construction audits demonstrating compliance with CO_2 reduction targets and incorporate Smart Meters that deliver monitoring data to the Local Authority for a minimum period of 3 years post-occupation;* *b. Statements setting out how development complies with the above strategic principles and spatial strategy should be provided; all Major development should be accompanied by an Energy Strategy/Assessment that:* *i. Conforms to latest GLA guidance (currently Energy Planning – March 2016) and requirements/guidance concerning Zero Carbon;* *ii. Prioritises connection to heat networks (where they exist or planned development is known) and confirms appropriate mechanisms will be put in place to ensure end customers are protected in respect of the price of energy and level of service provided;* *iii. Provides for connection to heat networks in future where connection is not made prior to occupation (including detail of any required retrofitting);* *iv. Demonstrates compliance with air quality standards, including the emissions standards for renewable and low-carbon plant set out in London Plan guidance2; and* *v. Confirms that the risks of overheating have been addressed through the design of the development, as per policy SC1.* *c. Developments connecting to heat networks will provide evidence of ongoing management mechanisms, ensuring end customers are protected in respect of the price of energy and level of service."* Policy SC1 relates primarily to measures to adapt to climate change and is therefore considered further in Part B of this chapter. In terms of GHG assessment, the requirements for Building Performance Standards are relevant. These require all new major applications that are not solely residential new build to achieve "Excellent" under the BREEAM UK New Construction or BREEAM UK Domestic Refurbishment / Non- Domestic Refurbishment and Fit-Out. These policies require developments to comply with a number of principles including demonstrating consistency with the London Plan's zero carbon targets and their resilience to future climate change risks. The GHG assessment (Part A) has considered the implications of the change in airport GHG emissions (i.e. excluding aircraft emissions) resulting from the proposed development in relation to policies and targets set by the Newham Local Plan. Part B Climate Resilience assessment has considered measures to adapt to future climate change.

Other Guidance

11.2.5 The following further guidance and reports are relevant to the assessment of climate change for the purposes of this Chapter.

Table 11-5 Guidance relevant to the climate change assessment

Guidance	Summary of Relevant Guidance
Institute of Environmental Management and Assessment (IEMA) guidance on Assessing Greenhouse Gas Emissions	Provides guidance on whole life assessment and mitigation of GHG emissions within an EIA context including guidance on the assessment of significance of any change in GHG emissions. The IEMA guidance has informed the GHG assessment (Part A) including the assessment of significance of the proposed development.

Guidance	Summary of Relevant Guidance
and Evaluating their Significance (2022)[28]	
The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GHG Protocol)[29]	Provides standards and guidance for preparing a GHG emissions inventory including their classification under different scopes depending on the degree of control that can be exerted on them. The GHG assessment (Part A) has classified GHG by scope to inform proportionate mitigation.
Publicly Available Standard (PAS) 2080: 2016 – Carbon Management in Infrastructure[30]	Provides an approach to management of GHG emissions from infrastructure projects, working with stakeholders throughout the project lifecycle. The guidance has informed the GHG assessment approach.
RICS Whole Life Carbon Assessment for the Built Environment[31]	The guidance provides a methodology for calculated the whole life carbon emissions of buildings and structures. The guidance has been used to inform the assessment of construction-phase GHG emissions.
RICS Methodology to calculate embodied carbon of materials[32]	The guidance provides data on embodied carbon within buildings and structures and a methodology to estimate embodied carbon of materials. The guidance has been used to inform the assessment of construction-phase GHG emissions.
The European Monitoring and Evaluation Programme (EMEP) / European Environment Agency (EEA) Guidebook (2019)[33]	The Guidebook provides guidance and data for the calculation of aviation emissions over the cruise[34] and Landing and Take Off[35] (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_2 emissions from aviation, with various 'tiers' or levels of accuracy. The Tier 3A approach has been used by the GHG assessment, since it provides the highest level of accuracy and is consistent with the forecast data available for the proposed development.
The London Environment Strategy (2018)[36]	The London Environment Strategy, published in May 2018, sets out an action plan for environmental improvement in London up to 2050 and covers a range of core environmental aspects including energy and climate change, air quality, green infrastructure, waste and noise. The strategy sets a series of targets, including the aim to make London a zero-carbon city by 2050; reiterating the same commitment as is included in the London Plan. Since its publication, the Mayor of London has committed to bring forward London's net zero target from 2050 to 2030. At the time of publication of the London Environment Strategy, the UK's ambition was to achieve an 80% reduction in emissions by 2050. Since then, both national and local climate ambition has increased. At a national level, the UK has committed, through the 6th carbon budget, to reach a 78% reduction in emissions by 2035 (relative to 1990 levels) and to reach net zero emissions by 2050. The GHG assessment (Part A) has considered the implications of the change in airport related GHG emissions resulting from the proposed development in relation to the targets set by the London Environment Strategy.
National Planning Practice Guidance on Climate Change (2019)[37]	This guidance sets out how to identify suitable mitigation and climate adaptation measures to incorporate into the planning process. Paragraph 001 states *"effective spatial planning is an important part of a successful response to climate change as it can influence the emission of greenhouse gases."* Paragraph 004 states: *"Sustainability appraisal can be used to help shape appropriate strategies in line with the statutory duty on climate change and ambition in the Climate Change Act 2008."* Part B of this assessment has considered measures to adapt to future climate change.

[28] IEMA (2022) Assessing Greenhouse Gas Emissions and Evaluating their Significance. 2nd Edition. February 2022

[29] The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (no date).

[30] Publicly Available Standard (PAS) 2080 Carbon Management in Infrastructure.

[31] RICS (2017) Whole Life Carbon Assessment for the Built Environment (1st edition)

[32] RICS (2012) Methodology to calculate the embodied carbon of materials (1st edition)

[33] EEA/EMEP (2019) Air Pollutant Emission Inventory Guidebook.

[34] The Cruise phase covers departures only and constitutes climb from 3,000 ft (914m), cruise and descent to 3,000ft

[35] The Landing and Take Off cycle accounts for aviation movements below 3,000ft at the proposed Development

[36] Mayor of London (2018), The London Environment Strategy

[37] Ministry of Housing, Communities & Local Government (2019) National Planning practice guidance

Guidance	Summary of Relevant Guidance
IEMA Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation (2020)[38]	This IEMA guidance provides a framework for the effective consideration of climate change resilience and adaptation in EIA, in line with the 2014 amendment to the EU EIA Directive (2014/52/EU). The guidance has informed Part B of this assessment.
The UK Climate Projections 2018 (UKCP18)[39]	Provides data on projected change in climate variables for the UK and in the location of the proposed development. UKCP data informed Part B of this assessment.
Met Office UK (2019) UK Climate Projections: Headline Findings[40]	This report presents key findings from UKCP18 for the UK. This guidance helped inform extreme weather assessment that may be relevant to the proposed development considered in Part B.
UK Climate Change Risk Assessment 2022 (HM Government, 2022)[41]	As required by the Climate Change Act 2008, the UK government has through this report undertaken the third five-year assessment of the risks of climate change on the UK. The risk assessment considers sixty-one UK-wide climate risks and opportunities cutting across multiple sectors of the economy and prioritised eight risk areas for action in the next two years. Part B of this assessment has considered measures to adapt to future climate change and risks identified through the UK's Climate Change Risk Assessment.

[38] IEMA, (2020). Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation

[39] Met Office UK, (2018). UK Climate Projections. [Online]. Available at: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

[40] Met Office UK, (2019). UK Climate Projections: Headline Findings. [Online]. Available at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp-headline-findings-v2.pdf

[41] Her Majesty's Government, (2022). UK Climate Change Risk Assessment 2022. [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1047003/climate-change-risk-assessment-2022.pdf

Part A: Greenhouse Gas Assessment

11.3 Assessment Methodology

Consultation

11.3.1 Table 11-6 below summarises comments raised during consultation and how those are addressed in the assessment.

Table 11-6 Consultation responses relevant to this chapter

Consultee	Issues Raised	How / Where addressed
GLA (raised during virtual meeting held on 10th June 2022)	The airport detailed the proposed scope of the assessment and provided an overview of proposed assessment methodology. It was also confirmed that an updated Energy Strategy was being prepared consistent with the S73 application. The GLA broadly welcomed the scope and methodology including the commitment to prepare an updated Energy Strategy. They requested that absolute emissions from the Development are presented and not just efficiency measures e.g., CO_2/pax. Additionally, the GLA requested that a Whole Life Cycle Assessment following GLA guidance be prepared.	A revised Energy Strategy has been prepared and results from the energy strategy are accounted for within the GHG footprint assessment for the proposed development. GHG emissions are presented in absolute terms throughout the assessment. See Section 11.10 and 11.12 A WLCA following GLA guidance has not been prepared due to lack of detail at this stage on the construction design. However, this assessment has produced a GHG footprint to allow the assessment of the likely significant effects from GHG emissions, and that includes consideration of GHG emissions from construction and operational phases of the proposed development.
London Borough of Newham (LBN) including technical advisors. (Raised during meeting held on 15th June 2022).	LBN raised questions about how the significance of effects would be evaluated.	The assessment of significance draws on IEMA guidance and policy set by the ANPS for the assessment of GHG emissions. Details of the approach to assessing significance are provided in the section Significance Criteria.
Scoping Opinion issued 24th November 2022, and Scoping Response Comments provided 27th October 2022 relating to CC8 and CC9	The applicant will need to acknowledge the wider context surrounding air travel, climate change and national climate targets in relation to the project (CC1).	The assessment methodology is described in the Section headed “Method of Assessment”, and the section headed “Significance Criteria”. These confirm that the assessment is concerned with establishing whether the project contributes to reducing GHG emissions consistent with a trajectory towards net zero.
	Clarification is sought on which scenario from the “Jet zero: further technical consultation” will be used to inform the modelling of both scenarios proposed (CC2).	The assessment has adopted the high ambition scenario to inform the assessment of aircraft emissions. This is appropriate since the Jet Zero Strategy published in July 2022 has set out policies consistent with this scenario, including an in-sector emissions pathway. Appendix 11.1 provides further details on assumptions adopted.
	Clarification is sought on whether the climate change assessment will only include ground operations (CC3).	The assessment of significance has considered all relevant emissions resulting from the proposed development, including ground and in-flight emissions. The consideration of context and significance is examined separately for airport and aircraft emissions since each is subject to different policies. See Section 11.12: Assessment of Significance.
	Please ensure that the most appropriate carbon budget is used to assess significance and its use is justified (CC4).	The 4th, 5th and 6th carbon budgets have been used to provide context consistent with the timeframe of the project. See Section 11.12.
	The applicant will need to provide more detail in regard to the following aspects of the climate resilience assessment (CC5): – Identify the scale and scope of the project, including design life	Part B of the assessment provides details on the methodology followed to assess resilience and addresses the points raised.

	– Identify the climate change projections for use in the assessment – Identify key climatic variables relevant to the project – Identify likely effects – Provide an outline of the method to be used to determine significance in regard to climate change adaptation and effect significance	
	In 7.5.29 a reference should be provided for this quote (CC6).	Para 7.5.29 of the scoping report refers to the following quote from 2022 IEMA guidance[28] found on page 21 of that document and states "*Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other".*
	In 7.5.31 a specific page reference should be provided to the location of the approach set out in the Airports National Policy Statement (CC7).	Paragraph 7.5.31 from the scoping report is reproduced below: The cumulative assessment will also not examine any cumulative GHG emissions of airport expansion in the UK. This is a matter for government policy and its Net Zero strategy; in the aviation context this is addressed through the DfT's Making Best Use policy[42] (recently reaffirmed in DfT's "Flightpath to the Future"[43]) and the emerging "Jet Zero" strategy[44]. This is consistent with the conclusions reached by the inspector to the Bristol expansion inquiry[45] who found (at Paragraphs 194 – 195 of the decision) that: "*No such national assessment is before the Inquiry. The ES/ESA dealt with the cumulative effects of the proposal in a local sense, but only the Government could fully consider the cumulative impact of individual proposals across the country. To expect an individual appellant to do so would be unreasonable. If that position were adopted, it would be tantamount to a moratorium on airport expansion, which is clearly not supported by policy..... There is no requirement to conduct a cumulative assessment of GHG emissions on the global climate and, in any event, it would not be feasible to do so."* Instead, as indicated above, the assessment will examine whether the increase in carbon emissions resulting from the project is so significant that it would have a material impact on the ability of Government to meet its carbon reduction targets, including its carbon budgets. This is consistent with the approach set out in the Airports National Policy Statement[46]. The reference to the ANPS was in relation to the key test set out by government to establish consistency of airport growth with its obligations, namely Paragraph 5.82 on page 60 of the ANPS. Section 11.9 provides a summary of expansion plans assumed by the Jet Zero Policy which has considered cumulative effects of UK airport expansion.
	The assessment should also account for 'indirect GHGs' in line with IPCC GWP evidence (CC8).	Emissions from aviation have both direct (CO_2, CH_4 and N_2O) and indirect (non-CO_2 emissions e.g. water

[42] DfT, The future of UK aviation: making best use of existing runways (June 2018).

[43] DfT, 'Flightpath to the Future' (May 2022).

[44] Jet Zero is the Government's strategy for net zero aviation: https://www.gov.uk/government/consultations/achieving-net-zero-aviation-by-2050#full-publication-update-history

[45] The Planning Inspectorate, Appeal decision, Town and Country Planning Act 1990, Appeal by Bristol Airport Ltd, Decision Date 2nd February 2022 – see paragraph 194-195

[46] DfT, Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England (June 2018), paragraph 5.82

		vapour, contrails, SO_2, NMVOCs, particles incl. black carbon, and NOx) climate change effects. The assessment discusses non-CO_2 emissions in Section 11.12 but addresses these separately from the proposed development's direct GHG emissions which are used to establish significance of effects.
	It is assumed that data on the stock supplies for the retail units will be available or at the very least estimates produced. Evidence should be provided to demonstrate that the emissions will be less than the 1% threshold as consumables often account for very high quantities of emissions (CC9). **Further clarification provided in Scoping Response Comments, dated 27th October:** Clear evidence should be provided. People's behaviours change when travelling. They may eat different types of food (e.g., convenience and highly processed food vs home cooked food), consume different drinks (e.g. more alcoholic drinks). The emissions of these consumables would likely be different than what may otherwise normally be consumed and may for example include a higher proportion of consumables are manufactured outside the UK, contributing higher emissions through additional transport. Due to availability, they may consume more food and drinks than they would normally do. For some, this may be due to nervousness when flying. In addition to the desire to screen out changes of less than 1%, all emissions should be correctly incorporated	Data on stock supplies for retail units is not readily available or held by the airport. Some passengers passing through the terminal will consume food, drinks and other products; however, there is limited data on the types and volumes of products consumed, and data on stock supplies for retail units is not readily available as retail activities are carried out by 3rd parties. Consumption of products at the airport is unlikely to be additional to consumption that would occur should passengers not travel to the airport. It is acknowledged that the types of food and drink consumed, the method of food preparation, and packaging may differ to the counterfactual of the same passenger in an alternative location, but there is no data available to guide an assessment into the relative carbon intensity of these two scenarios. Furthermore, a significant determinant of embodied carbon of food relates to dietary preferences and specifically choices around meat consumption. It is unlikely that passengers will alter their preference for meat versus lower carbon foods e.g., vegetarian or vegan alternatives when travelling therefore further reducing the likelihood that there is any material change in embodied emissions for food consumed at the airport versus the counterfactual where passengers do not fly. Similarly, the "food miles" of commonly bought products in the supermarket – vegetables, meat etc. are unlikely to be different to those used by outlets in the airport. Therefore overall, there is limited evidence to suggest any material differences in embodied emissions from passengers passing through the terminal versus not travelling through the airport. It is though acknowledged that the airport has a role to play in encouraging sustainable practices and behaviours among its third-party retailers and passengers, such as is evidenced by the commitment to achieve a 100% waste recycling rate by 2030 and eliminate all avoidable single use plastics in the airport by 2025[47]. The airport is also committed to addressing wider sustainability of its operations described further in the Sustainability Assessment forming part of this application. Accordingly, the Sustainability Assessment and Carbon and Climate Change Action Plan (see Appendix 11.3) identify actions for the airport to help manage embodied carbon from food and beverage consumption at the airport. Notwithstanding the above the emissions are in any case small as can be illustrated by taking a simplified approach as follows: • Government emission factor for food and drink consumed is 3,7 kg CO_2e per kg of food and drink[48]. • Assume 50% of departing passengers in 2031 in the with proposed development scenario consumed food with an average weight of 0.5kg.

[47] London City Airport (2022) Sustainability Action Plan: https://assets.ctfassets.net/jaqm1ntr8b50/4vI9fqwDcqxMV9xqFkDHOj/09203204d4edca5c13a1c16025d37e2a/Sustainability_Action_Plan.pdf

[48] Department for Business, Energy and Industrial Strategy (BEIS), 2022, Conversion factors 2022

		• Embodied emissions equal approximately 4,100 tonnes CO_2e by 2031. • This equals circa 1% of total GHG emission in 2031 for the DC Scenario (see Table 11.20). This estimate is also highly conservative as no decarbonisation of food production is assumed by 2031 meaning that the contribution of consumables would likely be less than 1% of operational emission in 2031. Therefore, recognising uncertainty, scale and the commitment by the airport to address these emissions they have not been explicitly included in the assessment but have been taken into account in identifying appropriate mitigation.

Scope of the Assessment

Technical Scope

11.3.2 The scope of the GHG assessment was defined through its:

- Study area;
- Assessment scenarios and sensitivities;
- Emissions types; and
- Activities contributing to GHG emissions.

11.3.3 Each is described further below, as well as any items that have been scoped out.

Study Area

11.3.4 GHGs contribute to climate change, which is a global environmental effect and as such the study area for the assessment is not limited by any specific geographical scope or defined by specific sensitive receptors.

11.3.5 The geographic scope was therefore determined by identifying emission sources associated with the proposed development over which the Applicant has some ability to control or influence, as detailed further below.

Assessment Scenarios and Sensitivities

11.3.6 The assessment is based on two core scenarios as detailed in Chapter 3 of the ES: EIA Methodology, the Do Minimum (DM) Case and the Development Case (DC) Scenario.

11.3.7 The climate change assessment considers the airport in the 2019 baseline and in the following assessment years:

- 2027, the year when the 6.5 mppa cap is forecast to be exceeded in the DC Scenario;
- 2031, the year proposed capacity of 9 mppa is forecast to be reached in the DC Scenario, and is the year when the net change in operational emissions between the DM and DC scenario is the greatest; and
- 2050, the year the UK is targeted to have reached net zero, and the timeframe for the Jet Zero Strategy.

11.3.8 Modelling of emissions is also carried out for each year between 2024 and 2050 to allow comparison to carbon budgets.

11.3.9 Two sensitivity cases are also considered within the DC scenario as described in Chapter 3 of the ES, a Faster Growth and a Slower Growth scenario. These are considered for the operational assessment only. The Faster Growth scenario sees the proposed 9 mppa capacity reached in 2029, and in the Slower Growth scenario, the proposed 9 mppa capacity is not reached until 2033.

Emissions types

11.3.10 GHGs are defined in terms of their Global Warming Potential (GWP), which is expressed in units of CO_2 equivalent (CO_2e) over 100 years. This allows for the emissions of the seven key GHGs: carbon dioxide

(CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6) and nitrogen trifluoride to be expressed in terms of their equivalent global warming potential, in mass of CO_2e. This assessment is confined to the emissions of these seven key GHGs (expressed as CO_2e.

11.3.11 Emissions are therefore reported as CO_2e throughout this assessment. The approach to indirect non-CO_2 effects is detailed in Section 11.12.

Activities contributing to GHG emissions.

Activities Scoped In

11.3.12 The GHG assessment has considered emissions from a range of sources associated with the proposed development across its construction and operational phases. These are grouped by GHG Protocol scope[49]. Classifying emissions into GHG Protocol scopes is important to delineate the degree of control over the emissions the airport exerts and thus the degree of mitigation it can apply.

11.3.13 The GHG Protocol scope definitions are:

- Scope 1: These include emissions from activities owned or controlled by the airport that release GHG emissions into the atmosphere. They are known as direct emissions and can be controlled by the airport.
- Scope 2: These include emissions released into the atmosphere associated with the airport's consumption of purchased electricity, heat, steam and cooling. These are indirect emissions that are a consequence of the airport's activities. Whilst the airport does not directly emit these emissions it can control them through its energy management and purchasing decisions.
- Scope 3: These include emissions that are associated with the airport but occur from sources which are not owned or controlled by the airport and are not classed as Scope 2 emissions. These are indirect emissions; the airport can influence these emissions but not control them.

Construction Phase

11.3.14 Under the DC Scenario, the proposed development would be constructed between 2025 and 2031. Under the DM Scenario, the construction phasing of CADP would be slower, with completion in 2038 or even being delayed indefinitely (under the DM 'No CADP' sensitivity case), as discussed in Chapters 3 and 6 of the Environment Statement.

11.3.15 To ensure a conservative assessment with regard to construction effects, no construction has been assumed in the DM Scenario and the future baseline emissions associated with construction activities are assumed to be zero.

In light of the above, the alternative construction programmes set in Chapter 3 of the ES are not considered further in the assessment of GHG emissions. Both the DC Slower Growth Scenario and DM No CADP1 Scenario would also see no or limited construction activity occurring between 2024 and 2031. Accordingly, the approach already adopted assumes a worst case scenario and there would be no difference in the construction emissions assumed under these sensitivity scenarios.

11.3.16 The sources of GHG emissions during the construction phase of the proposed development that are scoped in are from:

- Construction traffic;
- Construction plant and machinery; and
- Embodied in materials used in construction.

11.3.17 All GHG emissions from the construction phase are Scope 3 emissions.

Operational Phase

[49] The Greenhouse Gas Protocol (2001)

11.3.18 The GHG emissions scoped in from the operational phase are set out in Table 11-7 below. Consistent with the assessment methodology these are categories into **airport** and **aircraft** emissions

Table 11-7: Scope of GHG assessment

Scope	Type	GHG Emissions Source
Scope 1 (Direct Emissions)	**Airport**: Operational	LCY natural gas consumption
		Airside vehicles and plant
		Fire training activity
		Refrigerant loss
Scope 2 (Indirect Emissions)		LCY electricity consumption (grid connection)
Scope 3 (Indirect Emissions)	**Airport:** Other	Tenant grid electricity consumption
		LCY business travel
		3rd party airside vehicles and plant
		Waste management
	Airport: Ground Transport	Staff transport
		Passenger transport
	Aircraft	Aircraft activity (including Landing and Take Off (LTO) cycle, Climb, Cruise and Descent (CCD), Auxiliary Power Units (APU) and aircraft engine testing).

11.3.19 Figure 11-1 illustrates the sources of GHG emissions from typical aircraft both on the ground and in the air and the activities that make up the LTO and CCD cycles.

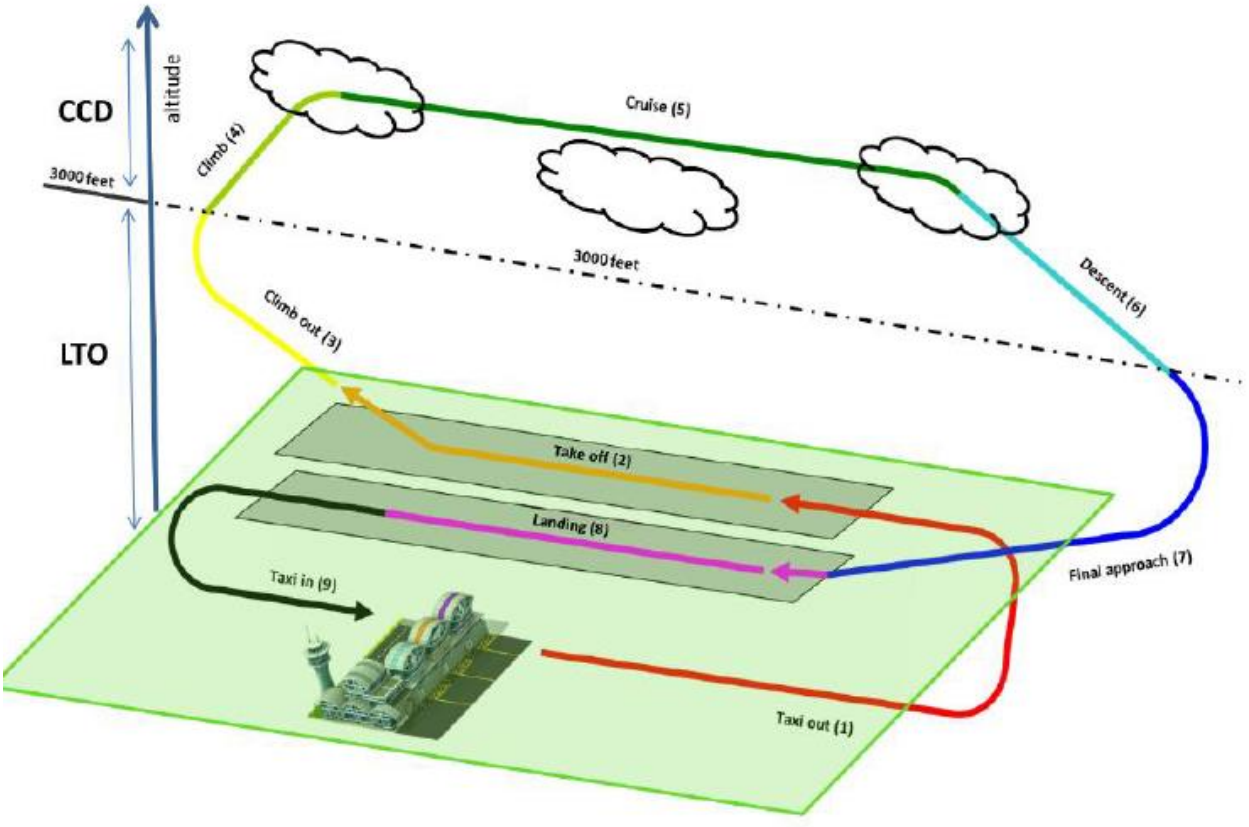


Figure 11-1 Aircraft Activities[50]

[50] Eurocontrol (2016) EUROCONTROL method for estimating aviation fuel burnt and emissions https://eurocontrol.int/sites/default/files/publication/files/emep-eea-air-pollution-emission-inventory-method-v1.0.pdf

11.3.20 To be consistent with the international convention of reporting and allocating responsibilities for international aviation (as defined by the United Nations Framework Convention on Climate Change), the assessment quantifies LTO emissions and departure CCD emissions. This also ensures consistency with UK reporting of aviation emissions and that the scope and significance is assessed on a like for like basis.

Activities scoped out

11.3.21 A small number of minor activities, detailed in Table 11-8 below, are not considered likely to give rise to significant effects and are scoped out of the assessment in line with IEMA guidance[28]. This recommends that individual activities with emissions that are less than 1% of total emissions, and where all such exclusions total a maximum of 5% of total emissions, can be scoped out of the assessment.

11.3.22 Accordingly, the sources of GHG emissions identified in Table 11-8 will not be considered for further detailed assessment of the associated GHG emissions.

Table 11-8 Greenhouse Gas Emissions to be scoped out of the ES

GHG Emissions Source	Description
Land use	GHG emissions resulting from land use change. The S73 Application does not include a land use change that could result in GHG emissions and so no land use change emissions will arise as a result of the project.
Potable water supply and treatment	GHG emissions associated with offsite potable water treatment and supply to site. Emissions from water supply and treatment will make up <0.1% of the project's GHG footprint and so are considered to be negligible.
Surface water	GHG emissions associated with offsite surface water treatment. Emissions from offsite surface water treatment will make up a very small component (<0.1%) of the project's GHG footprint and are considered to be negligible.
Passenger Consumables	Passengers passing through the terminal consume food, drinks and other products. However, there is limited data on the types and volumes of products consumed as retail activities are carried out by 3rd parties. There is also no data to evidence how passenger consumption patterns or behaviour change while travelling through the airport. GHG emissions associated with the treatment of any waste generated by these consumables however is included in the assessment. It is though acknowledged that the airport has a role to play in encouraging sustainable practices and behaviours among its third-party retailers and passengers, such as is evidenced by the commitment to achieve a 100% waste recycling rate by 2030 and eliminate all avoidable single use plastics in the airport by 2025[51]. The airport is also committed to addressing wider sustainability of its operations described further in the Sustainability Assessment forming part of this application. Accordingly, the Sustainability Statement and Carbon and Climate Change Action Plan (see Appendix 11.3) identify actions for the airport to help manage embodied carbon from food and beverage consumption at the airport. Notwithstanding the above the emissions are in any case small (in the order of 1%) as can be illustrated by taking a simplified approach set out in Table 11.6. Therefore, recognising uncertainty, scale and the commitment by the airport to address these emissions they have not been explicitly included in the assessment but have been taken into account in identifying appropriate mitigation.
Decommissioning	GHG emissions associated with decommissioning of the development at the end of its life. The airport is expected to continue to operate well past 2050, by which time the UK Government has committed to achieve net zero. As such, any GHG emissions from decommissioning are likely to be net zero.

Baseline Characterisation

11.3.23 The baseline GHG emissions associated with the airport for the baseline year of 2019 were calculated using activity data provided by the airport and Government CO_2e emission factors published by the Department for Business, Energy and Industrial Strategy (BEIS) (hereafter referred to as the 'BEIS GHG factors')[48]. For each GHG emission source at the airport, the following basic equation was used to calculate GHG emissions:

Activity Data x Activity Conversion method x GHG emission Factor = GHG Emissions (CO_2e).

[51] London City Airport (2022) Sustainability Action Plan: https://assets.ctfassets.net/jaqm1ntr8b50/4vI9fqwDcqxMV9xqFkDHOj/09203204d4edca5c13a1c16025d37e2a/Sustainability_Action_Plan.pdf

11.3.24 A summary of the activity data, activity conversion method and GHG emission factors used to calculate 2019 baseline GHG emissions at the airport are set out in Table 11-9.

11.3.25 Details of the technical methodology used is further set out in Appendix 11.1.

Table 11-9 2019 Baseline GHG Emissions Methodology

GHG Emissions Source	Activity Data	Activity Conversion method and GHG emission factors
Aircraft LTO Cycle	2019 arrivals and departures data showing all aircraft movements.	Fuel flows were calculated in the airport emissions inventory built for the air quality assessment[52] and combined with BEIS GHG factors for aviation fuel.
Aircraft CCD	2019 flight departures by destination airport.	Fuel consumption was calculated using the EEA/EMEP Aviation Emissions Calculator[33] based on aircraft type and distance to destination and combined with BEIS emission factors for aviation fuel to calculate CO_2e emissions.
Aircraft Auxiliary Power Unit (APU)	Typical APU run times on arrival and departure.	APU fuel flow from the ICAO Airports Air Quality Manual[53] was used to calculate fuel consumption and combined with the BEIS GHG factor for aviation fuel to calculate CO_2e emissions.
Aircraft Engine Testing	Aircraft engine ground run request logs.	Fuel flows are estimated from test duration and thrust setting using fuel flow data from ICAO engine emissions databank[54] and combined with BEIS GHG factors for aviation fuel to calculate CO_2e emissions.
Airside Vehicles and Plant (the Airport and 3rd party)	Annual fuel consumption data for the airport vehicles and 3rd party vehicles.	GHG factors for fuel consumption obtained from BEIS.
Fire training	Fuel for fire training exercises.	GHG factors for fuel obtained from BEIS.
Natural gas and electricity consumption	Annual natural gas and electricity consumption data for the airport and 3rd parties.	Fuel use and electricity use data is converted to CO_2e emissions using BEIS emission factors.
Passenger Transport	Passenger trips by transport mode (car, bus, taxi, rail) and passenger origin/destination based on CAA survey data.	Average travel distances are calculated by mode, multiplied by number of trips combined with GHG factors per km for transport modes obtained from WebTAG[55] and BEIS.
Staff Transport	Staff travel to work survey for travel mode distances.	Average travel distances are multiplied by number of annual trips and converted to CO_2e emissions using GHG emission factors per km for transport modes obtained from WebTAG[55] and BEIS.
LCY business travel	Distance travelled by mode based on expense claim data.	Travel distance by mode is converted to CO_2e using GHG factors per km for transport modes obtained from WebTAG[55] and BEIS.
Refrigerant loss	Loss of refrigerant by type from airport assets based on airport asset maintenance records.	Mass of refrigerant-by-refrigerant type is converted to CO_2e using GHG factors obtained from BEIS.
Waste management	Waste generation volumes, from airport waste contract data, split by type of waste.	GHG factors for waste treatment and disposal obtained from BEIS.

11.3.26 Modelling of future baseline emissions in future assessment years is described further below.

Method of Assessment

Construction Emissions

11.3.27 The assessment has modelled GHG emissions from the construction phase for the DC scenario. As detailed earlier no modelling has been completed of construction for the DM scenario as the phasing of this

[52] See Chapter 9: Air Quality.
[53] ICAO (2020) Airport Air Quality Manual
[54] ICAO (2019) Engine Exhaust Emissions Databank, [Online]: https://www.easa.europa.eu/easa-and-you/environment/icao-aircraft-engine-emissions-databank
[55] DfT (2022) Transport Analysis Guidance (WebTAG) Databook v1.18 May 2022

scenario is uncertain. To address this uncertainty, and ensure a worse case approach is adopted the assessment has conservatively assumed that construction emissions from the DM scenario are zero.

11.3.28 The modelling of each emission source over the DC construction period to 2031 has adopted the following approaches:

- Construction traffic emissions are calculated based on total construction traffic movements by vehicles type multiplied by average travel distances and BEIS emission factors applicable to each vehicle;
- Construction plant and machinery emissions are calculated based on benchmark data relating project spend to emissions obtained from RICS guidance[31]; and
- GHG emissions embodied in materials are calculated using embodied carbon benchmark values obtained from RICS[32].

11.3.29 Further details are provided in Appendix 11.1.

Operational Emissions

11.3.30 Future operational emissions have been modelled for 2027 and 2031 for both the DM and DC Scenarios, and every year between 2024 and 2031, as well as modelling of sensitivity tests (Faster Growth and Slower Growth DC Scenarios).

11.3.31 The modelling has been undertaken using broadly the same approaches as used to model the 2019 baseline. The main difference from the 2019 baseline is that the modelling of emissions in future years relies on forecasts of future activity at the airport. Similarly, emission factors are projected to improve in the future reflecting government policies to decarbonise the economy.

11.3.32 Forecasting future activity data relies principally on forecast changes in air traffic movements and passengers at the airport. The aviation forecasts for all scenarios that underpin the assessment are presented in Chapter 4 of the ES.

11.3.33 Table 11-10 provides a summary of methodologies and associated assumptions relating to forecasting future activity and emission factor data for each GHG emissions source with further detail provided in Appendix 11.1.

Table 11-10 Future GHG Emissions Method

GHG Emissions Source	Activity Data and associated assumptions	Activity Conversion method and GHG emission factors
Aircraft LTO Cycle	Future flight forecasts (annual flights by aircraft type) for 2027 and 2031 provided by York Aviation.	Fuel flows were calculated (taking into account fuel efficiencies associated with the introduction of future aircraft at the airport and use of SAF) in the airport emissions inventory built for the air quality assessment. These are combined with BEIS emission factors for aviation fuel to calculate CO_2e emissions.
Aircraft CCD	Future flight forecasts (annual flights by aircraft type) for 2027 and 2031 provided by York Aviation	Fuel consumption was calculated using the EEA/EMEP Aviation Emissions Calculator[56] based on aircraft type and distance to destination adjusted to account for future efficiencies from new aircraft types, operational efficiencies and use of SAF. Fuel use was converted to CO_2e using BEIS emission factors for aviation fuel.
Aircraft APU	Typical APU run times on arrival and departure are assumed to remain as in the 2019 baseline.	APU fuel flow from ICAO Airports Air Quality Manual[53] and a GHG factor for aviation fuel consumption.
Aircraft Engine Testing	Fuel flow from 2019 baseline ground engine testing extrapolated to future	Application of GHG factor for aviation fuel consumption.

[56] EEA/EMEP air pollutant emission inventory guidebook 2019 Chapter 1.A.3.a Aviation: http://www.eea.europa.eu/publications/emep-eea-guidebook-2019

GHG Emissions Source	Activity Data and associated assumptions	Activity Conversion method and GHG emission factors
	scenarios based on predicted change in ATMs.	
Airside Vehicles and Plant (the Airport and 3rd party)	Annual fuel consumption data from 2019 baseline extrapolated to future scenarios based on predicted increase in ATMs, and adjusted to account for rollover to electric fleet.	GHG emission factors based on government forecasts reflecting future efficiency improvements.
Natural gas and electricity consumption	Annual natural gas and electricity consumption data adjusted by growth in mppa (for electricity). No change assumed in gas use as this is predominantly for space heating and the terminal and ancillary spaces remain unchanged.	GHG emission factors based on government forecasts reflecting future efficiency improvements.
Fire training	No change assumed compared to the 2019 baseline fire training fuel use as a routine number of fire training exercises is expected.	GHG emission factors based on BEIS data.
Passenger Transport	2019 passenger trips by transport mode (car, bus, taxi, rail) and passenger origin/destination based on CAA survey data prorated by mppa and adjusted for change in mode share forecast under each future scenario as provided by the transport consultant Steer.	GHG emission factors based on DfT WebTAG data[55] which account for the uptake of electric road vehicles and reduction in petrol and diesel vehicle use and account for fuel and electricity efficiency improvements.
Staff Transport	Baseline staff modal split and travel distances from the staff travel survey adjusted by expected future staff numbers for each scenario. Future scenario modal splits are adjusted to account for staff travel plan measures as provided by the Transport consultant Steer.	GHG emission factors based on DfT WebTAG data[55] which account for the uptake of electric road vehicles and reduction in petrol and diesel vehicle use and account for fuel and electricity efficiency improvements.
LCY business travel	2019 distance travelled by mode adjusted by change of total airport passengers per scenario.	Travel distance by mode based on staff travel expense data and GHG emission factors based on government forecasts reflecting future efficiency improvements.
Refrigerant loss	Loss of refrigerant from airport assets: no change assumed from 2019 baseline.	Mass of refrigerant-by-refrigerant type is converted to CO_2e using GHG factors obtained from BEIS.
Waste management	2019 annual waste generation data factored to future scenarios based on total airport passengers per scenario.	GHG emissions factors for waste from BEIS. No decarbonisation of waste management has been assumed to provide a worst-case estimate of GHG emissions from waste.

11.3.34 Future operational emissions have also been modelled for 2050 for the DC and DM Scenarios. To model emissions after 2031, it was assumed that there is no further growth in ATMs and passengers at the airport or change in flight destinations from 2031 in the DM and DC scenarios.

11.3.35 The Government's Net Zero Strategy[24] sets out sectoral pathways (with the Jet Zero Strategy addressing the aviation sector specifically) and policies to meet the 4th, 5th and 6th carbon budgets and to reach net zero by 2050. For power generation, the Net Zero Strategy plans for 100% low carbon power generation by 2050 and, for ground transport, it forecasts that all ground transportation (apart from a small number of HGVs) will be electrically powered. As detailed in Table 11-2 the Jet Zero Strategy[25] confirms the Government's goal for UK aviation to be net zero by 2050.

11.3.36 Both the Net Zero and Jet Zero Strategies therefore forecasts that the aviation, power and ground transportation sectors are largely decarbonised by 2050, with any residual emissions removed through technical and/or natural means.

11.3.37 The implications of the UK adopting the economy wide and aviation net zero targets are that it is reasonable to assume that Government policies will be brought forward over the coming years to ensure these net zero targets are achieved as required under the legal duty of the Climate Change Act. The objective of the

Jet Zero Strategy is to align the UK ETS cap for aviation to be consistent with the Jet Zero Strategy's net zero trajectory is an example of policy to deliver the economy wide net zero target, as is the Government announcement bringing forward the ban on the sale of new vehicles that are not electrically powered to 2030.

11.3.38 Appendix 11.1 sets out specific assumptions that have been adopted regarding decarbonisation of the economy and aircraft out to 2050 that have been applied in the modelling. Specifically for aircraft emissions this concerns assumptions relating to ongoing fuel efficiency improvements of aircraft, take up of SAF and use of Zero Emission Aircraft (ZEA), especially for short haul journeys.

11.3.39 To ensure consistency with the Jet Zero Strategy, the modelling of aircraft emissions between 2031 and 2050 has been carried out consistently with the Government's "high ambition" scenario assumptions on aircraft decarbonisation. Accordingly, the following key assumptions have been made (see Appendix 11.1 for further detail):

- Continued annual fuel efficiency improvements from fleet replacements and air traffic management equalling 2% per annum from 2031;
- Zero SAF before 2030, 10% SAF by 2030, 22% by 2040 and 50% by 2050 with a lifecycle benefit of 70% relative to Jet A1 kerosene fuel; and
- Gradual replacement of aircraft in the fleet from 2035 with ZEA aircraft, resulting in 84% penetration of ZEA aircraft by 2050. The proportion of ZEAs in LCY's fleet has been established by York Aviation taking into account the aircraft fleet size breakdown applicable at LCY and guidance on the penetration of ZEA aircraft reported under the Jet Zero Strategy high ambition scenario. The penetration figure at LCY, whose fleet is dominated by short haul aircraft with seating capacities of less than 150 seats (which Jet Zero advises will be the first size category to be replaced by ZEAs) is therefore significantly higher than the 2050 penetration figure (27%) quoted by the DfT which is at a national level and includes significant proportion of aircraft types that are considered to be replaced by ZEA's at a slower rate or in some case not at all by 2050.

Significance Criteria

11.3.40 When assessing the effects from GHG emissions, there are no industry recognised significance criteria and thresholds for EIA purposes that relate to the quantum of GHG emissions released.

11.3.41 The approach to defining likely significant effects of the proposed development has been developed to reflect and consider the policy that applies to any change in emissions related to the proposed development. Taking this approach is particularly relevant for an airport since aircraft emissions are managed through national and international policy, whilst airport emissions are managed at a local level are under the control and influence of the airport.

11.3.42 The assessment of significance and the criteria adopted therefore distinguishes between:

- **Aircraft emissions** which, as detailed in Section 11.2, are to be considered at the national level and within the context of national controls and policy; and
- **Airport emissions** (which include all other sources that are not aircraft, i.e. from construction, energy use, ground transport, operational vehicles etc.), which are under the control and influence of the airport.

Aircraft Emissions

11.3.43 To assess the significance of the net change in aircraft emissions between the DC and DM scenario the following steps have been followed.

Step 1: Establish context and materiality

11.3.44 This step establishes the context and materiality of the net change in aircraft emissions between the DC and DM scenario through comparison to:

- The CCC's planning assumption (e.g. 37.5 MT CO_2e) which was taken into account when setting the 4th and 5th carbon budget;

- The 6th carbon budget (which included international aviation emissions); and
- The Jet Zero Strategy in-sector emissions trajectory.

11.3.45 The net change in emissions considered in each case coincides with the relevant benchmark. For example, when comparing the net change between the DC and DM scenarios to the 5th Carbon Budget the net change over the same period as that applicable to the budget (2028 to 2032) is calculated.

Step 2: Consistency with national policies seeking to reduce aircraft emissions to net zero

11.3.46 This step examines the consistency of the proposed development with national policies that seek to manage aircraft emissions consistent with the UK's net zero target. This step therefore considers;

- The consistency of the proposed development with the airport capacity assumed at the airport by the Jet Zero Strategy;
- The degree to which aircraft emissions fall within the UK ETS, and or other international instruments to manage emissions consistent with net zero; and
- The degree to which the proposed development is supportive of the mitigation relied on by Jet Zero to meet its in-sector trajectory.

Step 3: Consistency with ANPS test

11.3.47 This step establishes the implications of the net change in aircraft emissions taking into account their materiality and context (step 1) and consistency with net zero policies (step 2) in terms of the policy test established through the ANPS, specifically Paragraph 5.82 which states that:

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

11.3.48 As a supplementary step, the assessment of aircraft emissions has also been considered in the context of IEMA guidance set out below.

Airport Emissions

11.3.49 IEMA guidance[28] has been used to establish the significance of effect from airport emissions associated with the proposed development, applying expert judgment to the net effect of the proposed development's GHG emissions and taking into account their context, compliance with policy, and mitigation measures.

11.3.50 The IEMA guidance has defined five distinct levels of significance (see Table 11-11), which are not solely based on whether a project emits GHG emissions alone, but the degree to which the project's GHG emissions are consistent with emission trajectories towards net zero. For the UK, these trajectories are effectively defined by carbon budgets that are designed to achieve the UK's 2050 net zero target.

11.3.51 The UK's response to limiting climate change is enshrined in law through the Climate Change Act 2008 which requires 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 following a trajectory set through five yearly carbon budgets. The 2050 target (and interim budgets set to date) are, according to the CCC, compatible with the required magnitude and rate of GHG emissions reductions required in the UK to meet the goals of the Paris Agreement, thereby limiting severe adverse effects.

11.3.52 To establish the significance of the net change between the DM and DC Scenarios in emissions that are controlled and under the influence of the airport therefore requires judgements to be formed on:

- The proposed development's consistency with policy requirements, since these have been specified to ensure the economy decarbonises in line with the UK's net zero target; and
- The degree to which the proposed development has sought to mitigate its emissions.

11.3.53 Examining each of these dimensions allows professional judgement to be applied on the likely significance of effects based on a set of significance criteria established in the IEMA guidance, summarised in Table 11-11.

Table 11-11 GHG Significance Criteria

Significance Rating	GHG Context/Compliance with Net Zero	Compliance with Policy and Robustness, Timeliness and Efficacy of Mitigation
Major Adverse	A project with major adverse effects is locking in emissions and does not make a meaningful contribution to the UK's trajectory towards net zero.	The project's net GHG impacts are: ➢ not mitigated or are only compliant with do-minimum standards set through regulation; and ➢ do not provide further reductions required by existing local and national policy for projects of this type.
Moderate Adverse	A project with moderate adverse effects falls short of fully contributing to the UK's trajectory towards net zero.	The project's net GHG impacts are: ➢ partially mitigated; and ➢ may partially meet the applicable existing and emerging policy requirements but would not fully contribute to decarbonisation in line with local and national policy goals for projects of this type.
Minor Adverse	A project with minor adverse effects is fully in line with measures necessary to achieve the UK's trajectory towards net zero.	The project's net GHG impacts are: ➢ fully consistent with applicable existing and emerging policy requirements; and ➢ in line good practice design standards for projects of this type.
Negligible	A project with negligible effects provides GHG performance that is well 'ahead of the curve' for the trajectory towards net zero and has minimal residual emissions.	The project's net GHG impacts are: ➢ reduced through measures that go well beyond existing and emerging policy; and ➢ better than good practice design standards for projects of this type, such that radical decarbonisation or net zero is achieved well before 2050.
Beneficial	A project with beneficial effects substantially exceeds net zero requirements with a positive climate impact.	The project's net GHG impacts are: ➢ below zero; and ➢ it causes a reduction in atmospheric GHG concentrations, whether directly or indirectly, compared to the without-project baseline.

11.3.54 IEMA also advise that major and moderate adverse or beneficial effects should be considered significant in the context of EIA; minor adverse and negligible effects should be considered to be not significant;

11.3.55 Therefore, in summary the assessment of significance for airport (i.e. non-aircraft) emissions is established over two steps as follows:

Step 1: Establish Context of airport (non-aircraft) GHG Emissions

11.3.56 Context for decision making is provided by comparing the net change in the airport GHG emissions resulting from the proposed development with the 4th, 5th and 6th national carbon budgets. Net change is established by subtracting the GHG emissions from the DM scenario from the DC scenario for the same period as applicable to the benchmark that is being considered.

Step 2: Determine Significance of Effects of airport (non-aircraft) GHG emissions

11.3.57 Significance of effects is established through applying the criteria detailed in Table 11-11 based on professional judgement that considers consistency of the proposed development with national, GLA and local policies designed to limit GHG emissions and meet the UK's net zero target; and the robustness, timeliness and efficacy of mitigation measures proposed to avoid, reduce and compensate GHG emissions.

11.3.58 The significance of operational and construction emissions are not treated separately and therefore are summed together when comparisons are made to carbon budgets.

Assumptions and Limitations

11.3.59 The limitations and assumptions relating to the GHG assessment are:

- Assessment of embodied emissions from construction materials relies on average carbon intensity factors for the different building types. Some of the structures to be built at the airport are specialist buildings with no specific embodied carbon intensity factor. In these cases, an appropriate surrogate building type has been selected.
- In the absence of specific data on construction vehicle types, origin and destination, emissions from construction transport are based on assumptions on the vehicle types (e.g. HGVs and LGVs) and on average vehicle distances, obtained from guidance;
- Emissions from construction site activities are calculated following guidance using project cost estimates, which are valid at the time of writing;
- The assessment of emissions from aircraft was based on the aviation forecasts as set out in Chapter 2 of the ES. These require assumptions on future growth in demand, market shares and evolution of the fleet;
- Future emission factors are dependent on modelling and the development and implementation of Government policies. The assessment has relied predominantly on Government projections where available, or in some cases assumes no decarbonisation (e.g. waste) which is very conservative;
- Modelling of future aircraft types not included within the EEA EMEP tool has relied on an independent report produced for the DfT on fuel efficiency of next generation aircraft assumptions (described further in Appendix 11.1) on the likely fuel efficiency gains relative to existing types;
- The supply and use of SAF in aviation is currently low but is expected to increase with time. The assessment has relied on DfT high ambition scenario set out in the Jet Zero Strategy on the take up and life cycle efficiency of SAF;
- GHG emissions associated with electricity and or hydrogen consumed by Zero Emission Aircraft is assumed to be zero to be consistent with approach adopted by Jet Zero;
- Modelling of aircraft in the LTO cycle is reliant on assumptions regarding the engines used on specific aircraft, thrust settings during taxi, take-off and landing and the duration of taxi to and from the runway, which are representative of airport operations and agreed with the airport;
- Emissions from passenger transport to and from the airport are based on CAA survey data which was used to determine a primary transport mode for all passengers. Some passengers will use multiple modes (e.g., train and then bus) to access the airport, but calculations were based on the whole journey from origin to destination by the main mode;
- Future passenger transport emissions assume that measures to encourage a modal shift away from private car trips to DLR and bus trips are successful (in both DM and DC scenarios);
- Emissions from private cars and taxis, assume an average passenger loading factor (passengers per vehicle) which are based on analysis by the Applicant's transport consultant (Steer);
- Staff transport emissions were calculated from a staff survey data for a subset of airport staff and extrapolated based on total airport staff;
- Future energy consumption (gas, diesel, electricity) is reliant on assumptions regarding the future demand of the airport and (for electricity) the anticipated decarbonisation of energy supply and the airport's consumption; and
- Scope 1 and 2 emissions in the DM and DC scenarios fall to net zero by 2030 in line with the airport's sustainability roadmap[57] (DM) and Carbon and Climate Change Action Plan (see Appendix 11.3) (DC).

11.3.60 Table 11-9, Table 11-10, and Appendix 11.1 provide further details on assumptions adopted.

[57] LCY (2022) Above and Beyond: Our Roadmap to a Sustainable Future.

Comparison with Conclusions of the 2015 UES

11.3.61 The 2015 UES for the CADP1 planning application included a Chapter on climate change (UES Volume 1: Chapter 17).

11.3.62 As discussed in Chapter 3 of the ES, each technical assessment seeks to confirm whether or not the proposed development would give rise to new or materially different significant effects from those previously identified in the 2015 UES, where appropriate. With regard to this climate change assessment, a comparison of the effects identified is not considered appropriate for the primary reason that the 2015 UES did not provide any conclusions on the significance of effects in respect of carbon emissions and climate change.

11.3.63 The assessment methodologies adopted in the previous and current assessment also differ such that the results of the assessments cannot be compared in a useful way that would aid the decision making. In summary the differences are as follows:

- Government policy has moved on with a number of key aviation and climate strategies and policy documents published since the 2015 UES was completed, including the ANPS, Net Zero Strategy, Jet Zero Strategy and the move to a net zero 2050 target;
- the assessment methodology in this assessment has had regard to IEMA guidance, which was not published at the time the 2015 UES was completed;
- the 2015 UES focussed only on airport emissions and aircraft emissions in the LTO cycle; in-flight GHG emissions were excluded. Therefore, data in the UES on GHG emission per passenger are not on a like for like basis to this assessment;
- the underlying aviation demand forecast on which the assessments rely have been updated; and
- Government projections of decarbonisation have changed.

11.4 Baseline Conditions

Existing Baseline Emissions

The 2019 baseline GHG emissions associated with activities at the airport are summarised in Table 11-12 and

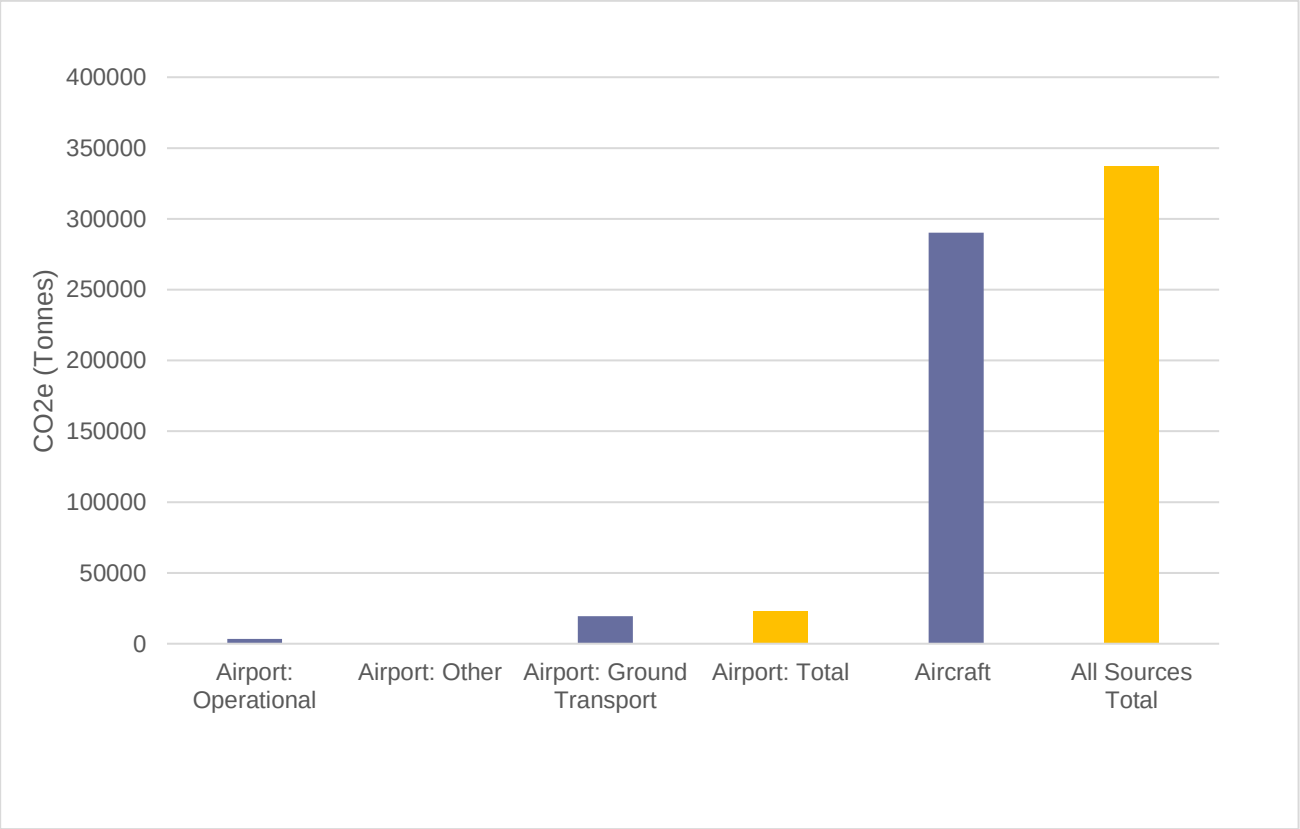
Figure 11-2.

11.4.1 Scope 1 and 2 emissions were independently verified as part of the airport's participation in ACI's Airport Carbon Accreditation Scheme (ACAS).

Table 11-12 2019 Baseline Greenhouse Gas Emissions

Scope	GHG Emissions Source	2019 CO_2e (T)	% of Total
Scope 1 & 2	Airport: Operational	3,328	1.06
Scope 3	Airport: Other	464	0.15
	Airport: Ground Transport	19,493	6.22
Airport: Total		***23,285***	***7.43***
Scope 3	Aircraft	290,293	92.57
Total All Sources		**313,578**	**100**
Note: values in the table have been rounded.			

Figure 11-2: 2019 Baseline Greenhouse Gas Emissions by source



11.4.2 The 2019 baseline GHG emissions associated with operational activities at the airport including ground transport are 23,285 tonnes and contribute 7.43% of the total footprint. GHG emissions from aircraft are the dominant source at 92.6%.

11.4.3 The 2019 baseline emissions are calculated to provide context to the assessment. Consistent with the methodology adopted they are not used directly in the assessment of significance.

DM Scenario Emissions

11.4.4 As discussed in Section 11.3 emissions associated with construction activities under the DM Scenario are assumed to be zero.

11.4.5 Predicted GHG emissions for each of the future assessment years are presented below as well as emissions by;

- carbon budget period; and
- aircraft activity covered by UK ETS, and per passenger.

11.4.6 The data presented below is used in the assessment to establish net change in emissions between the DM and DC scenarios (in 2027, 2031 and 2050 and relevant carbon budget periods) which informs the assessment of significance.

Total Emissions[58]

The predicted GHG emissions at the airport for the future assessment years under the DM Scenario are summarised in Table 11-13 and

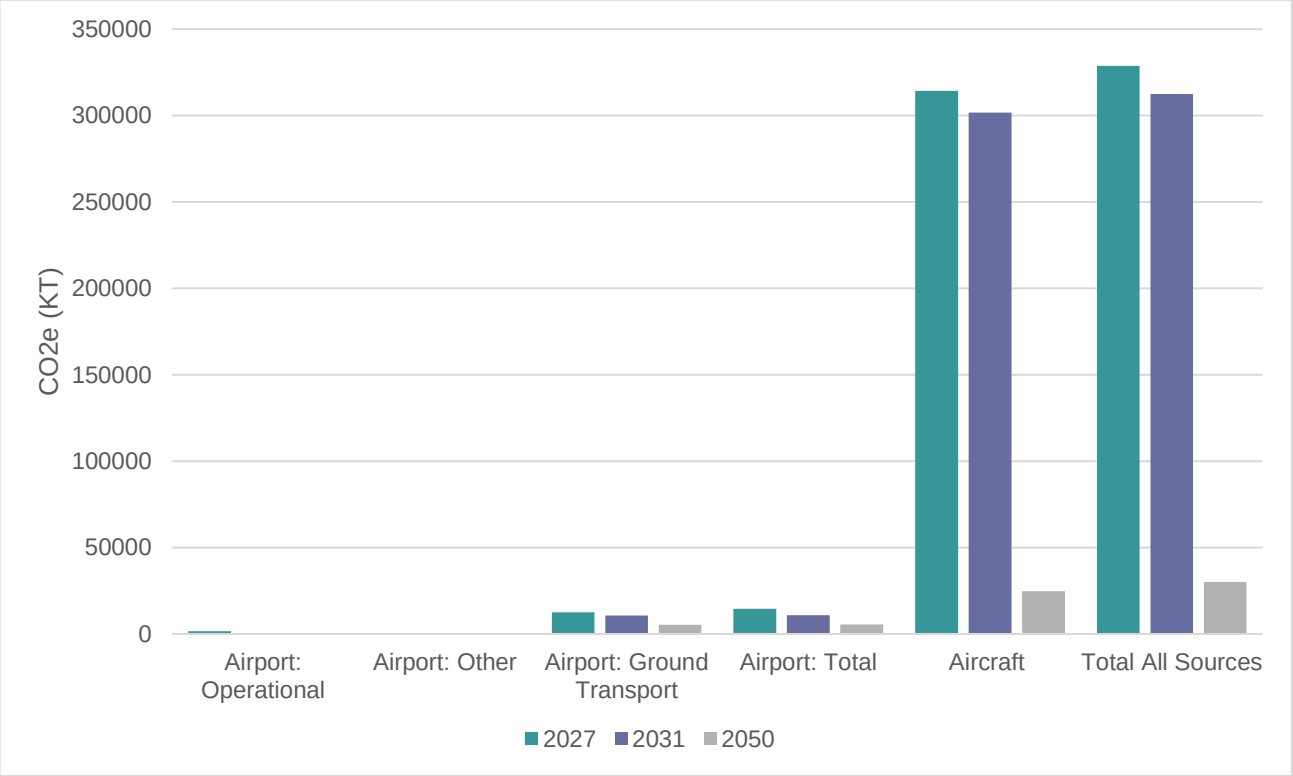
11.4.7 Figure 11-3. Note that where zero emissions are presented for scope 1 and 2 emissions in 2031 and 2050 this represents net zero emissions allowing for offset and removals.

[58] Total emissions are equal to operational emissions since construction emissions are assumed to be zero.

Table 11-13 DM Scenario Greenhouse Gas Emissions

Scope	GHG Emissions Source	CO_2e (Tonnes)		
		2027	2031	2050
Scope 1 & 2	Airport: Operational	1,634	0	0
Scope 3	Airport: Other	264	207	74
	Airport: Ground Transport	12,597	10,604	5,336
Airport: Total		***14,495***	***10,812***	***5,410***
Scope 3	Aircraft	314,326 *(Of which domestic: 41,127)*	301,683 *(Of which domestic: 39,366)*	24,772 *(Of which domestic: 3,232)*
Total All Sources		**328,821**	**312,494**	**30,183**

Figure 11-3 DM Scenario Greenhouse Gas Emissions



Reference to Table 11-13, and

11.4.8 Figure 11-3 shows that for the DM scenario:

- Aircraft emissions are the single largest source of emissions: they are lower in 2031 than in 2027 ;
- Emissions from ground transport fall over time consistent with a shift to public transport as well as ongoing decarbonisation of transport;
- Airport operational (Scope 1 and 2) emissions fall to net zero by 2030 consistent with the airport's net zero target; and
- Airport other (third party scope 3) emissions fall between 2027 and 2031 due to decarbonisation and then fall further in line with UK decarbonisation by 2050. They remain a very small component of the DM footprint.

11.4.9 As detailed in paragraphs 11.3.34 to 11.3.39 the modelling of aircraft emissions after 2031 has taken a top-down approach which has assumed that there is no further growth in passenger and air transport movements after 2031 and emissions from aircraft are decarbonised consistent with the Jet Zero Strategy high

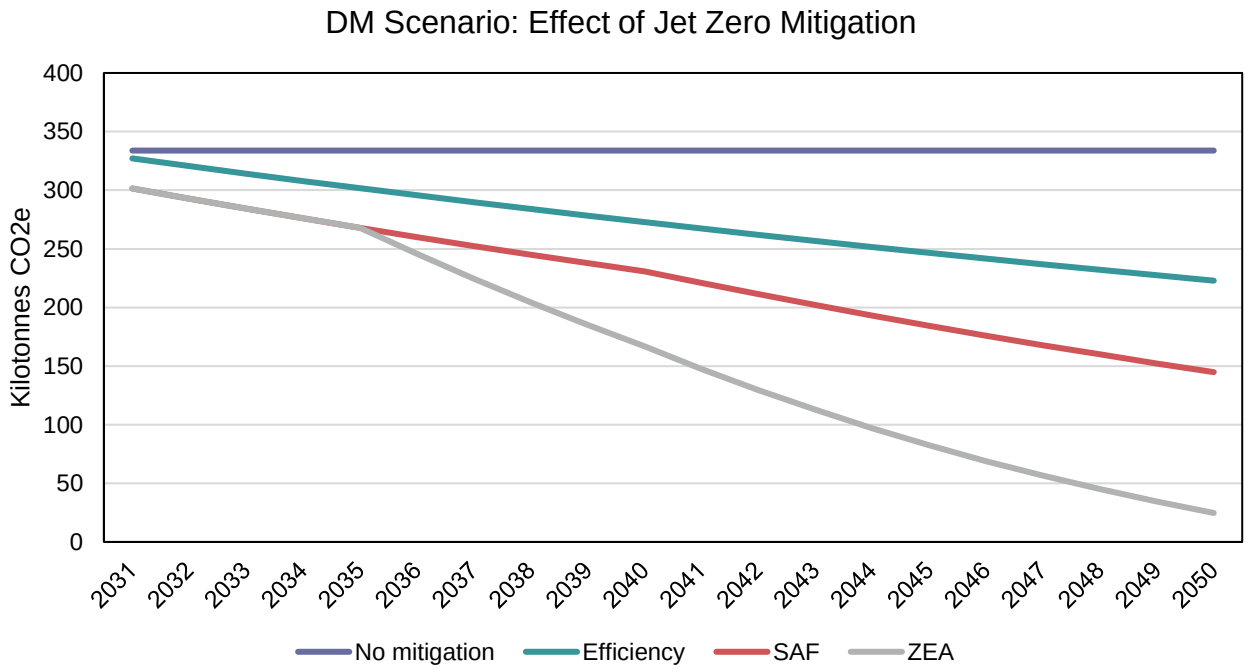
ambition scenario. Specifically, the decarbonisation of aircraft is projected to result from three key sources as follows;

- Continued annual fuel efficiency improvements from fleet replacements and air traffic management (2% per annum from 2031)
- Increasing take up of SAF (rising from 10% in 2030 to 50% by 2050), and
- Gradual replacement of aircraft with ZEA (rising from zero in 2035 to 84% of the fleet by 2050)

11.4.10 The relative contribution from each of these sources of mitigation is illustrated in

11.4.11 Figure 11-4 below.

Figure 11-4: Relative contributions of Jet Zero high ambition mitigation to aircraft emissions between 2031 and 2050 (DM Scenario)



11.4.12 Reference to Figure 11-4 shows the effect of including mitigation starting with a “no mitigation” scenario (the blue line), to a scenario where there are only savings from annual fuel efficiency improvements (the green line), a scenario which adds in savings from the use of SAF (the red line), and finally a scenario which adds in savings from the introduction of ZEA’s into the fleet (the grey line).

By Carbon Budget Period

11.4.13 Table 11-14 below summarises the predicted future emissions by source during the 4th, 5th and 6th carbon budget periods.

Table 11-14 DM Scenario GHG emissions during 4th, 5th and 6th carbon budget periods

Scope	GHG Emissions Source	CO_2e (Tonnes)		
		During 4th Carbon Budget (2023-2027)[59]	During 5th Carbon Budget (2028-2032)	During 6th Carbon Budget (2033-2037)
Scope 1 & 2	Airport: Operational	7,647	3,250	0
Scope 3	Airport: Other	1,179	1,147	758
	Airport: Ground Transport	61,508	54,952	41,801
	Construction	0	0	0
Airport: Total		***70,334***	***59,350***	***42,559***
Scope 3	Aircraft	1,209,455	1,589,563	1,299,310
Total All Sources		**1,279,789**	**1,648,913**	**1,341,869**

Reference to

[59] Emissions shown are for 2024 to 2027 only as the modelling in this assessment does not include 2023.

11.4.14 Table 11-14 shows that GHG emissions in the DM scenario will fall by just under 20% in the 5 years periods of the 5th and 6th carbon budgets. The totals presented show that emissions peak in the 5th carbon budget, however; the 4th carbon budget totals exclude emissions in 2023 (as the modelling undertaken for this assessment is for the years 2024 onwards). The emissions during the 4th carbon budget, if 2023 were to be accounted for, are expected to be similar to those shown for the 5th carbon budget.

11.4.15 The contribution of the emissions resulting from the proposed development's aircraft and airport emissions are compared to the appropriate carbon budgets as described in the assessment of significance and are included in Section 11.6.

Aircraft activity covered by UK ETS and per passenger

11.4.16 Table 11-15 below summarises predicted future GHG emissions from aircraft covered by the UK ETS (See also Appendix 11.2 for details). These are considered to be traded emissions.

Table 11-15 DM Scenario aircraft GHG emissions and UK ETS

GHG Emissions Source	Source breakdown	CO_2e Tonnes and % shown in brackets		
		2027	2031	2050
Aircraft	UK ETS: Domestic	41,127 (13.1%)	39,366 (13.1%)	3,232 (13.1%)
	UK ETS: International	269,767 (85.8%)	260,081 (86.2%)	21,356 (86.2%)
	Not covered by the UK ETS	3,432 (1.1%)	2,235 (0.7%)	184 (0.7%)
Totals		314,326	301,683	24,772

11.4.17 In the DM Scenario circa 99%% of GHG emissions are covered by the UK ETS, with the remaining 1% covered by CORSIA.

11.4.18 Table 11-16 below provides further data on aircraft GHG emissions expressed as tonnes CO_2e per passenger, as well as the percentage change relative to the 2019 baseline.

Table 11-16 DM Scenario aircraft emissions per passenger

Year	GHG Emissions (Tonnes CO_2e/pax)	% Change vs 2019
2019	0.0568	0%
2027	0.0582	2%
2031	0.0464	-18%
2050	0.0038	-93%

11.4.19 Figure 11-5 below summarises the % change in aircraft emissions in tonnes/pax between the 2019 baseline year and future assessment years under the DM Scenario.

Figure 11-5 DM Scenario % Change Aircraft Emissions vs 2019

11.4.20 Reference to Table 11-16 and Figure 11-5 shows that between 2019 and 2031 CO_2e/pax falls by 18%. Between 2019 and 2050 CO_2e /pax falls by 93% driven by decarbonisation of aircraft reflecting the high ambition scenario set out through the DfT's Jet Zero Strategy.

11.5 Embedded Mitigation and Existing Controls

11.5.1 Embedded mitigation measures to reduce GHG emissions from the proposed development relate to measures identified in the Transport Assessment (ES Volume 4), the Energy Strategy, Sustainability Roadmap and the Outline Carbon and Climate Change Action Plan (CCCAP).

Passenger and Staff Transport

11.5.2 The Transport Assessment (Chapter 10) identifies measures to reduce private vehicle trips and encourage a modal shift towards higher proportions of sustainable and active travel (i.e. public transport, cycling and walking). Key components identified include;

- A Travel Plan to encourage the use of sustainable modes and discourage vehicle use by passengers and staff, which includes measures to encourage staff car sharing and pick up charges for passengers;
- Contribution towards enhancing local walking and cycle facilities;
- Increased facilities for secure cycle parking;
- Provision of an enhanced forecourt;
- Contributions towards enhancing DLR and bus services;
- Extending Hartmann Road eastwards to join the A117 Woolwich Manor Way (the Eastern Access) and associated changes to highway signage, including provision for segregated pedestrian and cycle routes;
- No additional car parking provision over what has been consented; and
- Contribution towards establishing a localised Controlled Parking Zone on roads.

Energy Strategy

11.5.3 Measures to reduce and avoid GHG emissions through energy efficient design and the use of renewable energy have been assessed in an Revised Energy and Low Carbon Strategy[60] for the not yet built elements of the consented CADP1 scheme. The key measures employed within the Energy Strategy to avoid and reduce GHGs emissions, following the GLA's energy hierarchy to Be Lean, Be Clean and Be Green are set out in Table 11-17.

[60] Atkins (2022) City Airport Development Programme. Section 73: Revised Energy and Low-Carbon Strategy.

Table 11-17 Energy Mitigation Summary

Measure	Description
Be Lean Measures – Minimise Energy Demand	
Fabric first design	Proposed building fabric specifications which exceed the Part L2A 2021 Building Regulations requirements in terms of lower U-values for external walls, roof, external windows and glazed external doors. U-values meet the 2021 regulations for ground floor slab and exposed floors.
Low power fans	Air handling units (AHUs) specific fan power (SFP) reduced to 1.45 W/l/s, heat recovery increased to 85% and free cooling facility to reduce energy demand in the summer.
	Fan coil unit terminal units SFPs reduced from 0.3 W/l/s to 0.2 W/l/s
High efficiency chillers	High efficiency air cooled chillers with a seasonal efficiency (SEER) of 5.27.
Low energy lighting	The energy efficiency measures for lighting systems include: - An average installed luminaire efficacy of 110 lumens per circuit Watt achieved across the buildings. - Provision, in zones with access to daylight, for photoelectric controls by which the output of the lighting system will be regulated in response to the daylight level to reduce both the lighting and cooling loads. - Provision for occupancy sensing, where appropriate to the use of the space.
Kitchen extract heat recovery	Installing Kitchen extract heat recovery systems for commercial application, recovered heat to the kitchen area supply air.
Variable Air Volume (VAV) conditioned air replacement	Replacing centralised VAV conditioned air distribution systems (high volume/energy requirement) with tempered fresh air only plus local fan coil units (FCUs), as seen in other areas of the building.
Be Clean Measures – Achieve High Energy Efficiency	
Remove gas CHP and boilers	The consented CADP scheme included provision for gas fired CHP and boiler systems to provide heat to CADP buildings. These systems will no longer be brought forward in favour of alternative heat solutions, thus eliminating the use of natural gas for CADP buildings.
District Heat Network (DHN) connection	Provisions are to be made to allow connection to a nearby DHN in the future. No viable options are currently available, but EON's Silvertown DHN has been identified as a potential future connection that can be explored.
Be Green – Use Renewable Energy	
Air Source Heat Pumps (ASHPs)	The gas CHP and boilers proposed for the Eastern Energy Centre will now be replaced with electrically powered ASHPs to provide clean, emission-free heat and hot water to CADP buildings.
Photovoltaics (PVs)	A total of 1,165 m^2 of CADP roof area will be used for PV cells, to generate an estimated 139 MWh per annum of renewable energy on-site.

Sustainability Roadmap and Outline Carbon and Climate Change Action Plan

11.5.4 In addition to the measures described in Table 11-17 to minimise GHG emissions from energy provision to the yet built CADP1 buildings, the airport is planning to achieve net zero Scope 1 and 2 emissions by 2030. Measures to reach this target are set out in the airport's Sustainability Roadmap[57] and the outline Carbon and Climate Change Action Plan (CCCAP) appended as Appendix 11.3. The detailed CCCAP will be secured through a planning condition and commits the airport to 3 headline climate change targets, as follows:

- To reduce the emissions the airport controls (Scope 1 and 2) to net zero by 2030 and to zero by 2040;
- To work with airlines to reduce flight emissions to net zero by 2050; and
- For buildings to achieve BREEAM 'Very Good' certification as a minimum.

11.5.5 As stated in the assumptions and limitations section the assessment has assumed the airport reaches net zero scope 1 and 2 emissions by 2030 in both the DC and DM scenarios.

11.5.6 The airport is also targeting to be the UK's best-connected airport to public transport with 80% of all passenger journeys to the airport to be made by sustainable transport modes by 2030 which will also reduce GHG emissions.

11.6 Assessment of Effects

Predicted GHG Emissions

11.6.1 GHG emissions are presented separately for the construction and operational phase and summed together. Results are presented for the future assessment years under the DC Scenario, as well as the net change in GHG emissions relative to the DM Scenario. Emissions are also presented by:

- Carbon budget period[61]; and
- Aircraft activity covered by the UK ETS, and by passenger.

Construction Phase

11.6.2 The construction phase emissions over the construction period (assumed to be 2025 to 2030) under the DC Scenario are summarised in Table 11-18 below. As set out earlier, to ensure a worst-case assessment, the construction emissions in the DM scenario are assumed to be zero. The net change between the DM and DC Scenarios is therefore the same as the total emissions under the DC Scenario.

Table 11-18: DC Scenario Construction Emissions

Source	DC Scenario and Net Change (CO_2e Tonnes) over construction period	% of total
Airport: Construction Site activity	5,156	5.5
Airport: Construction traffic	8,348	8.9
Airport: Embodied emissions in materials	80,791	85.7
Total Airport Construction (all scope 3)	**94,295**	**100**

11.6.3 Embodied carbon represents the single largest source of construction related emissions at 85.7%. Total GHG emissions across the construction phase are calculated to be 94,295 tonnes CO_2e. These emissions are assumed to occur between 2025 and 2030 resulting in annual construction emissions over this period of 15,716 tonnes CO_2e per annum. Appendix 11.2 provides details on emissions by year.

Operational Phase

The predicted future operational phase GHG emissions at the airport under the DC Scenario, and the change relative to the DM scenario are summarised in

[61] The comparison to carbon budgets includes the cumulative total of both construction and operational emissions

Table 11-19,

Figure 11-6 and

11.6.4 Figure 11-7. Note where zero emissions are presented for scope 1 and 2 emissions in 2031 and 2050 this represents net zero emissions allowing for offset and removals.

Table 11-19 DC Scenario Greenhouse Gas Emissions and Net Change vs DM Scenario

Scope	GHG Emissions Sources	DC Scenario (CO_2e Tonnes)			Net Change DC vs DM (Tonnes CO_2e)		
		2027	2031	2050	2027	2031	2050
Scope 1 & 2	Airport: Operational	1,911	0	0	276	0	0
Scope 3	Airport: Other	321	265	100	57	58	25
	Airport: Ground Transport	15,851	14,527	7,258	3,254	3,922	1,922
Airport: Total (excluding construction)		***18,082***	***14,792***	***7,357***	***3,587***	***3,980***	***1,947***
Scope 3	Aircraft	344,090 *(Of which domestic: 41,252)*	374,727 *(Of which domestic: 41,804)*	34,381 *(Of which domestic: 3,836)*	29,763	73,045	9,609
Total All Sources		**362,172**	**389,519**	**41,739**	**33,350**	**77,024**	**11,556**

Figure 11-6 DC Scenario Greenhouse Gas Emissions

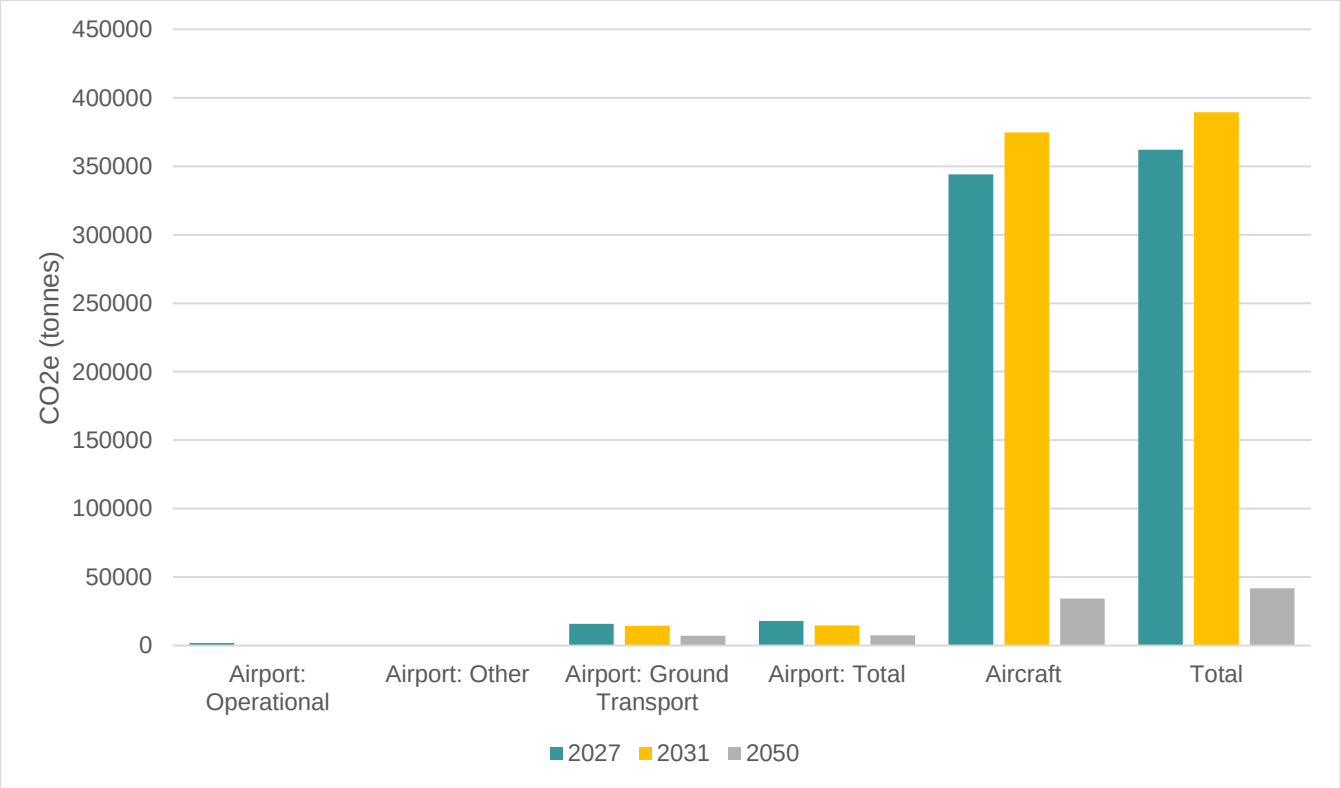
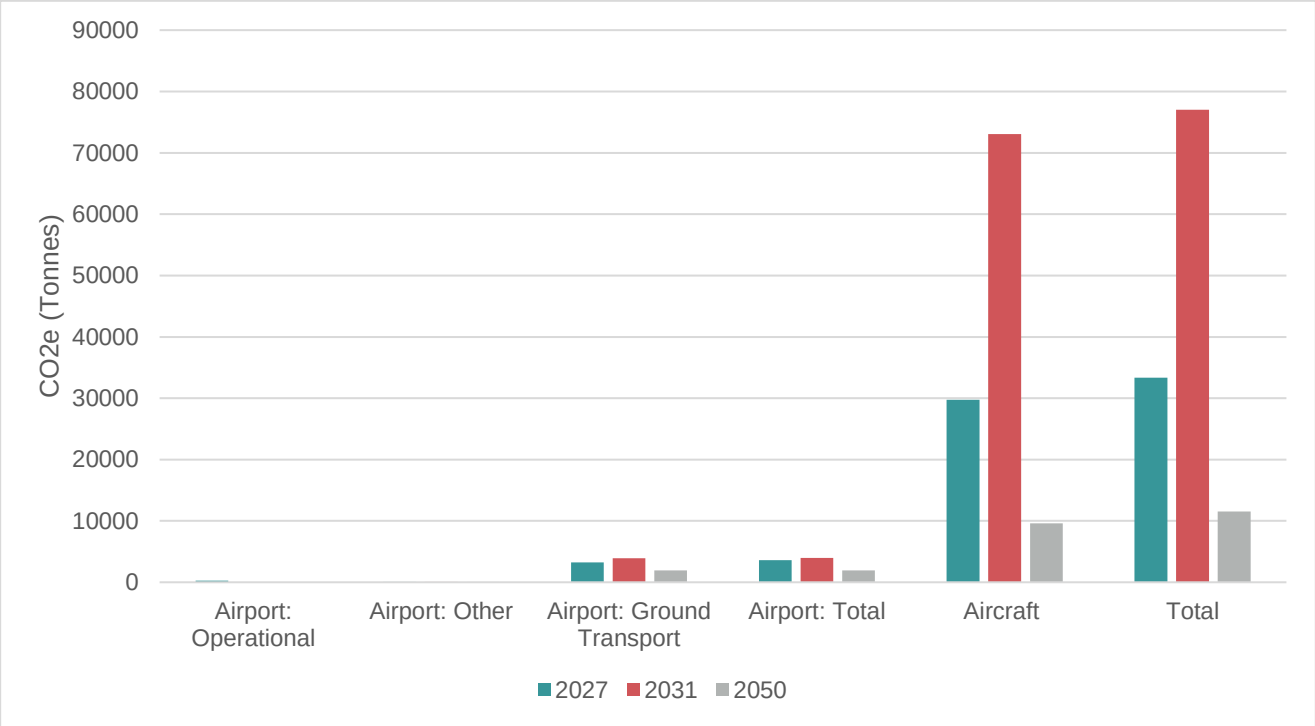


Figure 11-7 Net Change between DC and DM Scenarios Greenhouse Gas Emissions



Reference to

Table 11-19,

Figure 11-6 and

11.6.5 Figure 11-7 shows that for the DC Scenario:

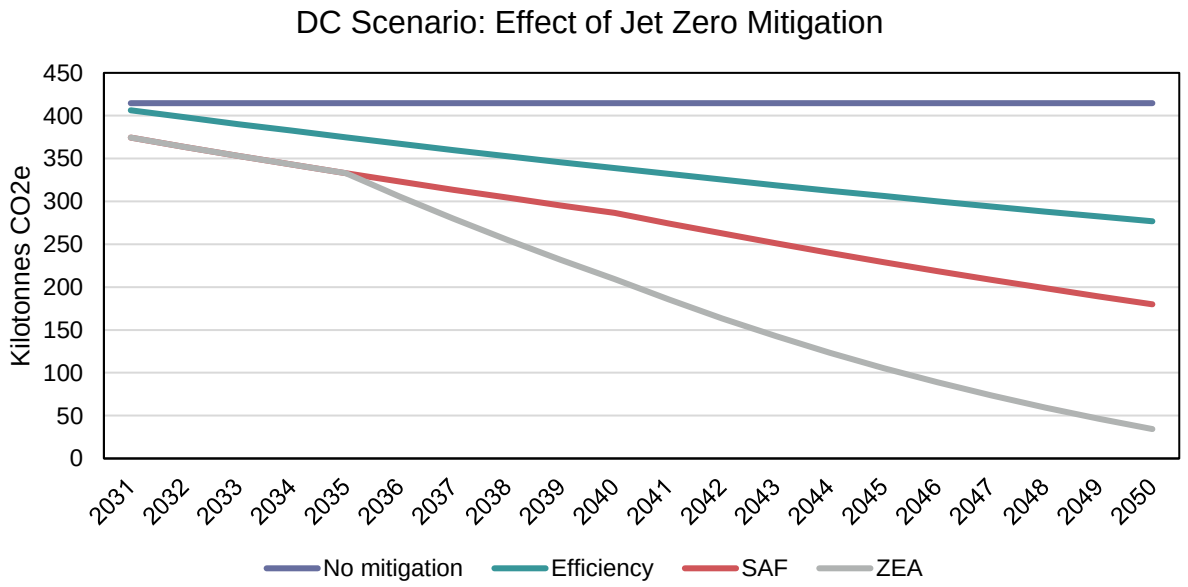
- Aircraft emissions are the single largest source of emissions and are higher in 2031 compared to 2027 driven by increasing passengers and passenger km travelled. However, emissions then fall significantly by 2050 due to increasing take up of SAF, use of ZEA and ongoing fuel efficiency improvements of conventional aircraft consistent with DfT's Jet Zero Strategy high ambition scenario;
- Emissions from ground transport fall over time despite growing passenger numbers due to modal shift to public transport as well as the ongoing decarbonisation of transport;
- Airport operational (Scope 1 and 2) emissions are net zero after 2030 due to measures adopted by the airport to meet its Scope 1 and 2 net zero target, including implementation of the airport's energy strategy;
- The net change in airport operational (Scope 1 and 2) emissions between the DC and DM scenarios is zero in 2031 and remains at zero until 2050; and
- The net change in aircraft emissions is higher in 2031 compared to 2027 and falls significantly by 2050[62].

11.6.6 As detailed in paragraphs 11.3.34 to 11.3.39 the modelling of aircraft emission after 2031 has taken a top-down approach which has assumed that there is no further growth in passenger and air transport movements after 2031 and emissions from aircraft are decarbonised consistent with the Jet Zero high ambition scenario. Specifically, the decarbonisation of aircraft is projected to result from three key sources as follows:

- Continued annual fuel efficiency improvements from fleet replacements and air traffic management (2% per annum from 2031);
- Increasing take up of SAF (rising from 10% in 2030 to 50% by 2050); and
- Gradual replacement of aircraft with ZEA (rising from zero in 2035 to 84% of the fleet by 2050).

11.6.7 The relative contribution from each of these sources of mitigation is illustrated in Figure 11-8 below.

Figure 11-8: Relative contributions of mitigation to aircraft emissions between 2031 and 2050 (DC Scenario)



11.6.8 Reference to Figure 11-8 shows the effect of including mitigation starting with a "no mitigation" scenario (the blue line), to a scenario where there are only savings from annual fuel efficiency improvements

[62] Appendix 11.2 shows that the net change in aircraft emissions between the DM and DC scenarios is highest in 2031.

(the magenta line), a scenario which adds in savings from the use of SAF (the red line), and finally a scenario which adds in savings from the introduction of ZEA's into the fleet (the grey line).

Total Emissions (Construction and Operational)

11.6.9 Total airport GHG emissions for the DC scenario including construction are the same as in Table 11-19 apart from in 2027 when adding the annual construction emissions (see Paragraph 11.6.3) the total airport emissions are 33,798 tonnes CO_2e and total all sources are 377,888 tonnes CO_2e, and net change in 2027 for airport emissions are 18,970 tonnes CO_2e and all sources are 49,066 tonnes CO_2e.

By Carbon Budget Period

11.6.10 Table 11-20 below summarises the predicted future emissions in the DC Scenario (from operations and construction) and the net change between the DM and DC Scenarios by source during the 4th, 5th and 6th Carbon Budget periods.

Table 11-20 DC Scenario GHG emissions during 4th, 5th and 6 Carbon Budget Periods

Scope	GHG Emissions Source	DC Scenario (CO_2e Tonnes)			Net change between DC and DM Scenarios (CO_2e Tonnes)		
		During 4th Carbon Budget (2023-2027)	During 5th Carbon Budget (2028-2032)	During 6th Carbon Budget (2033-2037)	During 4th Carbon Budget (2023-2027)	During 5th Carbon Budget (2028-2032)	During 6th Carbon Budget (2033-2037)
Scope 1 & 2	Airport: Operational	8,240	3,713	0	593	464	0
Scope 3	Airport: Other	1,294	1,411	976	114	263	218
	Airport: Ground Transport	64,762	71,398	57,160	3,254	16,446	15,359
	Construction[63]	47,148	47,148	0	47,148	47,148	0
Airport: Total		***121,443***	***123,670***	***58,137***	***51,109***	***64,320***	***15,577***
Scope 3	Aircraft	1,278,426	1,858,079	1,615,151	68,971	268,516	315,841
TOTALS		**1,399,870**	**1,981,749**	**1,673,287**	**120,081**	**332,836**	**331,418**

11.6.11 Reference to Table 11-20 shows that GHG emissions in the DC scenario will fall by just over 13% in the 5 year periods of the 5th and 6th carbon budgets. As was the case with the DM Scenario, the calculations for the 4th carbon budget exclude emissions in 2023. Should these be included the emissions during the 4th carbon budget are expected to be similar to those shown for the 5th carbon budget.

Aircraft activity covered by UK ETS and per passenger

11.6.12 Table 11-21 below summarises predicted future GHG emissions from aircraft covered through the UK ETS for the DC Scenario and the net change between the DC and DM Scenarios. These are traded emissions.

Table 11-21 DC Scenario aircraft GHG emissions and UK ETS

GHG Emissions Source	**Source breakdown**	DC Scenario - CO_2e Tonnes (% of total in brackets)			Net change between DC and DM Scenarios (CO2e Tonnes)		
		2027	**2031**	**2050**	**2027**	**2031**	**2050**
Aircraft	UK ETS: Domestic	41,252 (12.0%)	41,804 (11.2%)	3,836 (11.2%)	124	2,438	603
	UK ETS: International	299,509 (87.0%)	330,695 (88.0%)	30,341 (88.0%)	29,742	70,614	8,985
	Not covered by the UK ETS	3,329 (1.0%)	2,228 (0.6%)	204 (0.6%)	-103	-7	21
Totals		**344,090**	**374,727**	**34,381**	**29,763**	**73,045**	**9,609**

[63] Construction emissions occur only during the 4th and 5th carbon budget and are included here to ensure the comparisons to the carbon budget considers all emissions

11.6.13 As was the case in the DM Scenario, at least 99% of GHG emissions are covered by the UK ETS in the DC Scenario, with the remaining 1% covered by CORSIA.

11.6.14 Table 11-22 below provides further data on aircraft GHG emissions expressed as tonnes CO_2e per passenger, as well as the percentage change relative to the 2019 baseline.

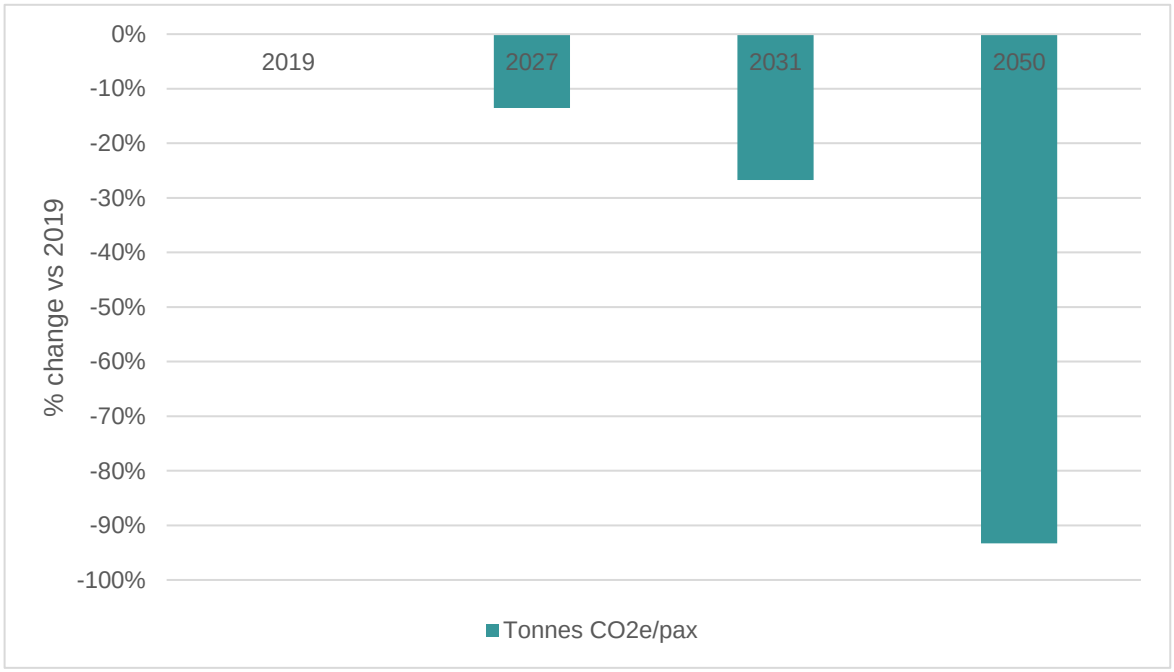
Table 11-22 GHG emissions from Aircraft per passenger

Year	DC Scenario GHG Emissions (Tonnes CO_2e/pax)	% Change vs 2019
2019	0.0568	0%
2027	0.0492	-14%
2031	0.0416	-27%
2050	0.0038	-93%

11.6.15

11.6.16 Figure 11-9 below summarises the % change in aircraft emissions in tonnes/pax between the future assessment years and the 2019 baseline.

Figure 11-9 DC Scenario % Change Aircraft Emissions vs 2019



11.6.17 Reference to Table 11-22 and

11.6.19 Figure 11-9 shows that between 2019 and 2031 CO_2e/pax falls by 27%. Between 2019 and 2050 CO_2e/pax falls by 93% driven largely through measures to decarbonise aviation set out in the Jet Zero Strategy.

Assessment of Significance

11.6.20 The assessment of significance is presented separately for **aircraft** and **airport** emissions as explained in Section 11.4.

Aircraft Emissions

11.6.21 The three step process for assessing significance of aircraft emission is followed below including a supplementary step taking into account IEMA guidance.

Step 1: Establish context and materiality.

11.6.22 The materiality of the aircraft emissions is established associated with the proposed development by comparison of the net change in aircraft emissions between the DM and DC scenarios (in each case over the same timeframe) to the following in turn:

- the "Planning Assumption" that was taken into account when setting the 4th and 5th carbon budget;
- the 6th carbon budget; and
- to the DfT's Jet Zero Strategy's high ambition in-sector trajectory.

Comparison to Planning Assumption

Table 11-23 Comparison of Aircraft GHG emissions from DC and DM scenario to Planning Assumption taken into account in setting the 4th and 5th carbon budget

Planning Assumption assumed by Carbon Budget[64]	Aircraft emissions during the Carbon Budget in MT CO_2e			As % of Planning Assumption		
	DC Scenario	DM Scenario	Net Change	DC Scenario	DM Scenario	Net Change
4th carbon Budget period (187.5 MT CO_2)	1.28	1.21	0.07	0.68	0.65	0.04
5th carbon budget period (187.5 MT CO_2)	1.86	1.59	0.27	0.99	0.85	0.14

11.6.23 Reference to Table 11-23 shows that in both the DC Scenario and DM Scenario, the contribution from aircraft emissions to the planning assumption is small, representing 0.68% (DC) and 0.65% (DM) of the planning assumption in the 4th carbon budget, and 0.99% (DC) and 0.85% (DM) of the planning assumption in the 5th carbon budget. These equate to a net increase of 0.04% in the 4th carbon budget and 0.14% in the 5th carbon budget.

Comparison to 6th Carbon Budget

Table 11-24 Comparison of GHG emissions from DC and DM scenario to 6th carbon budget

Aircraft emissions in MT CO_2e (6th Carbon Budget)				As % of 6th Carbon Budget		
6th Carbon Budget	DC Scenario	DM Scenario	Net Change	DC Scenario	DM Scenario	Net Change
965	1.62	1.30	0.32	0.17	0.13	0.03

11.6.24 Reference to Table 11-24 shows that the contribution from aircraft emissions to the 6th carbon budget is 0.17% (DC) and 0.13% (DM), a net change of 0.03% (values rounded). The contribution is very small because aircraft emissions are a small % of the planning assumption.

Comparison to DfT Jet Zero in-Sector Trajectory

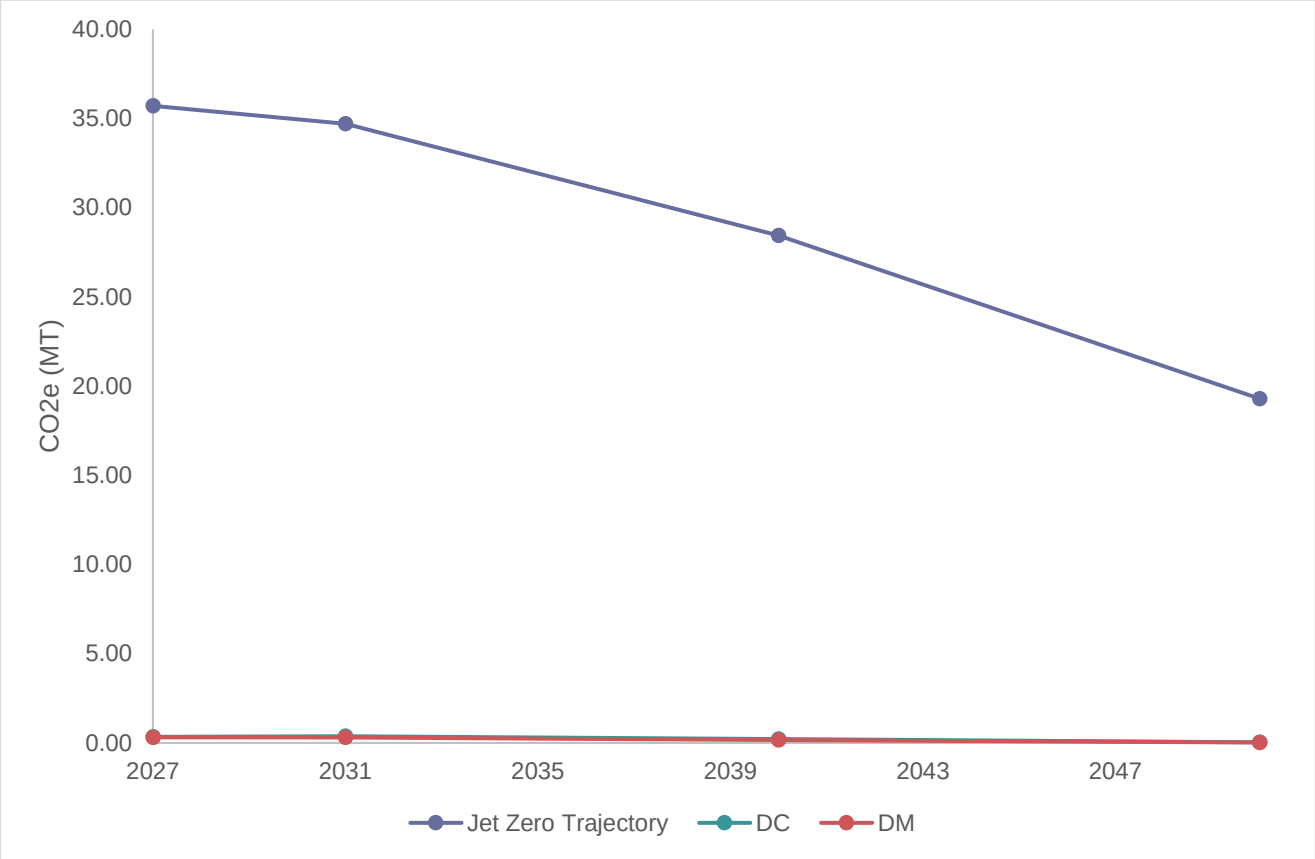
Table 11-25 Aircraft GHG Emissions relative to DfT Jet Zero In-Sector Trajectory

Year	Emissions (Million Tonnes CO_2e)				% of Jet Zero trajectory		
	Jet zero in-sector emission trajectory	DC Scenario	DM Scenario	Net Change	DC Scenario	DM Scenario	Net Change
2027	35.69	0.34	0.31	0.03	0.96	0.88	0.08
2031	34.69	0.37	0.30	0.07	1.08	0.87	0.21
2040	28.43	0.21	0.17	0.04	0.74	0.59	0.15
2050	19.29	0.03	0.02	0.01	0.18	0.13	0.05

11.6.25 The in-sector trajectory and aircraft emissions in the DC and DM scenario are further illustrated in Figure 11-10 below.

[64] The carbon budgets are for 5 years; therefore, the planning assumption has been multiplied by 5

Figure 11-10: In sector trajectory comparison to DC and DM aircraft emissions



11.6.26 Reference to Table 11-25 and Figure 11-10 show that in both the DC Scenario and DM Scenario, the contribution of LCY's aircraft emissions to the Jet Zero in-sector trajectory is very small. LCY's aircraft emissions are small at a national scale due to the relatively small scale of the airport as well as the predominance of short haul flights.

11.6.27 In 2031, the DC Scenario would contribute just 1.08%, compared to 0.87% in the DM Scenario. LCY's contribution to the trajectory grows between 2027 and 2031 in the DC Scenario, but reduces between 2031 and 2040, and further by 2050. Overall, however as shown in Figure 11-10 the contribution in each scenario and year is very small.

Step 2: Consistency with national policies seeking to reduce aircraft emissions to net zero

11.6.28 Table 11-26 below summarises the assessment of the aircraft emissions from the proposed development in terms of:

- the airport capacity assumed at LCY in comparison to the Jet Zero Strategy;
- the degree to which aircraft emissions fall within the UK ETS and or other international instruments to manage emissions consistent with net zero; and
- the degree to which the proposed development is supportive of mitigation relied on by Jet Zero to meet its in sector trajectory.

Table 11-26 Further Policy Assessment of the Proposed Development

Assessment factors	Finding	Conclusion
Airport capacity assumed at LCY in comparison to the Jet Zero Strategy	The proposed development assumes growth to a capacity of 9mppa. This compares to a capacity of 11mppa assumed by the Jet Zero Strategy that Government considers to be consistent with its in-sector trajectory and net zero.	The proposed development is consistent with Government policy on LCY growth and capacity that is assumed by its net zero target for UK aviation.
Coverage of emissions by regulatory	99% of Aircraft emissions are subject to the UK ETS cap. Jet Zero Strategy has committed to aligning the UK ETS cap with the net zero trajectory.	The Aircraft emissions associated with the proposed development are subject to regulations that have

instruments including UK ETS and CORSIA		been identified by Government to meet its net zero targets and climate change obligations.
Support of mitigation relied upon by Jet Zero	The Jet Zero Strategy has set the following policies that are relevant to aircraft emissions from the proposed development: • UK domestic flights to reach net zero by 2040; • By 2025, a SAF mandate will be in place that requires fuel suppliers to reduce the greenhouse gas emissions of aviation fuel by the equivalent of at least 10% SAF use by 2030; • To have zero emission routes connecting different parts of the United Kingdom by 2030; and • To support industry to develop the ground infrastructure necessary to fuel and handle zero emission aircraft. LCY are committed to being a leading player in facilitating zero carbon flights in the UK and aims to facilitate its first zero emissions flight within the next decade. LCY Initiatives to support the transition to zero emission flights include: - Restrictions which permit only next generation aircraft to fly on Saturday afternoons. This has resulted in aircraft GHG emissions per pax between 2019 and 2031 falling by 27% in the DC scenario compared to 18% in the DM scenario; - Alongside airlines, aircraft manufacturers and fuel suppliers review opportunities for providing the necessary storage and refuelling facilities needed to increase the usage of SAFs by airlines, with an ambition to be in line with Government policy of 10% SAF use by 2030; - Working with partners to adapt the airport's infrastructure and operating environment to facilitate the development and roll-out of new generation aircraft, the use of SAF, and emerging technologies in hybrid, and hydrogen-powered aviation; - Reviewing the overall technical and commercial viability of future zero-carbon emission aircraft and developing feasibility assessments of airport and local infrastructure requirements for their operation and assessing options available in the Royal Docks, as well as potential supply options involving delivery through the Estuary and along the River Thames; and - Continue to support key electric flight initiatives across the aviation sector. LCY has further committed to support and enable airlines to decarbonise consistent with Jet Zero's high ambition scenario by ensuring the airport masterplan is consistent with airline needs relating to SAF and ZEA aircraft. Specifically, to complete a feasibility study to establish any near- and longer-term requirements such that those can be accommodated in future masterplans.	The proposed development is supportive of measures set out by the Jet Zero Strategy that have been identified to meet the in- sector trajectory.

11.6.29 Reference to Table 11-26 shows that the proposed development is consistent with government policies to manage aircraft emissions consistent with the UK's net zero target.

Step 3: Consistency with ANPS test

11.6.30 Paragraph 5.82 of the ANPS states that:

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

11.6.31 In terms of this policy test the assessment shows that;

- Net aircraft GHG emissions due to the proposed development would amount to only 0.04% of the planning assumptions used to set the 4th carbon budget, and only 0.14% of the planning assumptions used to set the 5th carbon budget;
- Net emissions from aircraft would amount to only 0.03% of the 6th carbon budget;
- Aircraft emissions in the DC Scenario account for 1.08% of the DfT in-sector trajectory in 2031 and fall to 0.18% in 2050, a net increase of 0.21% in 2031 and 0.05% in 2050 relative to the DM Scenario;
- The proposed development is consistent with Government policy on LCY growth and capacity that is assumed by its net zero target for UK aviation;
- The aircraft emissions associated with the proposed development are subject to regulations that have been identified by Government to meet its net zero targets and climate change obligations (specifically 99% are covered by the UK ETS and the remainder by CORSIA); and
- The proposed development is supportive of measures set out by the Jet Zero Strategy that have been identified to meet the in-sector trajectory.

11.6.32 It light of the above, it is considered that the proposed development would not result in a material impact on the ability of the Government to meet its carbon reduction targets, including carbon budgets, and therefore the effect of the proposed development on GHG emissions from aircraft is considered to be not significant in EIA terms.

Supplementary step: Consideration of IEMA guidance

11.6.33 A further supplementary step has been undertaken which is to assess the aircraft emissions associated with the proposed development using IEMA's guidance. Specifically, Table 11-11 states that an effect is considered to be Minor Adverse (and therefore not significant) when a project is fully in line with measures necessary to achieve the UK's trajectory towards net zero which is considered to require the project's net GHG impacts to be:

- fully consistent with applicable existing and emerging policy requirements; and
- the emissions are mitigated in line good practice design standards for projects of this type.

11.6.34 In terms of policy consistency, it is evident that the net change in aircraft GHG emissions is consistent with policy (notably Jet Zero and the ANPS). In terms of mitigation, it also evident that Government, and to the extent relevant, the airport, are taking steps to mitigate those emissions consistent with best practice. For example, incentives to accelerate take up of newer generation aircraft reduce per pax emissions in the DC scenario compared to the DM scenario.

11.6.35 Therefore, using IEMA's guidance and categorisation of effects set out in Table 11-11 the net aircraft GHG effects of the proposed development are also assessed as Minor Adverse, not significant.

Airport Emissions

11.6.36 The assessment of significance of airport emissions (excluding emission from aircraft) has been completed following IEMA's guidance using the 2-step methodology set out earlier.

Step 1: Establish Context of GHG Emissions

11.6.37 Context for airport emissions (e.g., all operational and construction related emissions excluding emissions from aircraft) from the proposed development is provided through comparison to UK's 4th, 5th and 6th carbon budgets provided in Table 11-27 below.

Table 11-27 Comparison of airport GHG emissions from DC and DM scenario to 4th, 5th and 6th carbon budgets

Period	Carbon Budget	Airport Emissions in MT CO_2e			As % of Carbon Budget		
		DC Scenario	DM Scenario	Net Change	DC Scenario	DM Scenario	Net Change
4th Carbon Budget (2023-2027)	1,560[65]	0.12	0.07	0.05	0.008	0.005	0.003
5th Carbon Budget (2028-2032)	1,725	0.12	0.06	0.06	0.008	0.004	0.004
6th Carbon Budget (2033-2037)	965	0.06	0.04	0.02	0.004	0.003	0.001

11.6.38 Reference to Table 11-27 shows that in both the DC Scenario and DM Scenario, the airport's contribution to national carbon budgets is very small and, following a peak in the 5th carbon budget, both the absolute contribution and the net change contribution is a lower portion of the 6th carbon budget than the 5th carbon budget.

Step 2: Determine Significance of Effects (Airport Emissions)

a) Policy Compliance

National Policy Compliance

11.6.39 The Government has set out a number of sector specific strategies to decarbonise the power and transport sector described in Table 11-2. The proposed development has adopted measures that are supportive of these national policies to meet net zero, specifically;

- The airport's target to achieve net zero Scope 1 and 2 emissions by 2030, and ambition to become a zero emissions operational airport by 2040;
- the transport mitigation measures embedded into the proposed development its target for 80% of all journeys to and from the airport to be made by sustainable modes of transport by 2030;
- measures to reduce waste (e.g. eliminating avoidable single use plastics by 2025 and 100% recycling target for 2030 set out in LCY's sustainability roadmap[57]); and
- measures to encouraging the rollover of airside fleet and plant from diesel to electric.

11.6.40 The other key national policy relevant to the assessment of airport GHG emission sources is the NPPF. Paragraphs 154 b), 155 and 157 within Part 14 are of particular relevance and are detailed in Table 11-2. In response to these requirements:

- the proposed development incorporates a range of measures aimed at reducing GHG emissions during its operation. The airport has also committed to a 2030 net zero goal for its own activities (Scope 1 and 2). Accordingly, the proposed development does not conflict with Paragraph 154 b) of the NPPF.
- As described in the Energy Strategy for the proposed development, the approach to energy for the CADP buildings will involve a fabric-first energy efficient design, a zero-emission ASHP-led heat network, safeguarding for future DHN connections, and provision of PV cells for generating renewable anergy on site. The proposed development therefore complies with Paragraph 155 of the NPPF.
- Compliance with the local development plan is discussed in the following paragraphs, but as set out in the Energy Strategy the proposed development will include a change to the technology provided within the consented Eastern Energy Centre, with a switch from gas-fired CHP to an electric ASHP system. With the exception of some limited changes to the forecourt and aircraft parking the S73 Application is not applying for any new or changes to the consented buildings or infrastructure and therefore building landform, layout and orientation is not considered relevant to this application. As such the proposed development does not conflict with Paragraph 157 of the NPPF.

[65] 4th carbon budget is 1,950 MT, but this has been adjusted to represent a 4-year (instead of 5-year period) as emissions for the proposed development have only been calculated for 2024 onwards and therefore exclude 2023.

11.6.41 Overall, it is considered that the proposed development complies with the requirements of national planning policy relevant to other GHG emissions.

Regional Policy Compliance

11.6.42 Policy SI 2 of the London Plan[26] requires that major development should be net zero carbon and provide a detailed energy strategy to demonstrate how this target will be met. The policy sets a minimum target for new (non-domestic) buildings to achieve a 35% reduction in on-site CO_2 emissions compared to the requirements of Part L of the Building Regulations, including a 15% reduction from energy efficiency (Be Lean) measures alone.

11.6.43 The Energy Strategy[60] submitted in support of the proposed development sets out the energy assessment for the proposed development, which demonstrates that the design will achieve an overall reduction in CO_2 emissions compared to the Part L baseline of 46%, including 25% saving from energy efficiency (Be Lean) measures alone (see Table 3.2 of the Energy Strategy). These savings exceed the Policy SI 2 targets of 35% (overall) and 15% (energy efficiency) and therefore the proposed development complies with the requirements of Policy SI 2 of the London Plan.

11.6.44 With regard to London Plan Policy T8 (see Table 11-3) GHG emissions have been fully accounted for in this assessment and assessed against Jet Zero Strategy in sector trajectory that has been set by Government to meet its obligations under the Climate Change Act. The Jet Zero Strategy has taken into account growth at the airport as well as at other UK airports. The airport has committed to net zero operational emissions (Scope 1 and 2) by 2030 which is aligned with the Mayor's carbon reduction targets.

Local Policy Compliance

11.6.45 The relevant local development plan policy for GHG emissions is Policy SC 2 summarised in Table 11-4.

11.6.46 In terms of Policy SC2, the proposed development has a detailed energy strategy following the Be Lean, Be Clean and Be Green hierarchy that meets the requirements of Policy SI 2 of the London Plan. Provision is being designed in to allow a future connection to a DHN via the eastern energy centre (i.e. decentralised energy/heat network) and in the meantime adopts a strategy using ASHPs for heating.

11.6.47 The Energy Strategy[60] sets out measures incorporated into the design, which accord with the design requirements set out in Policy SC2 Part 3. Therefore overall, the proposed development is consistent with Policy SC2.

11.6.48 Newham's BC Policy INF2 on Sustainable Transport is also relevant. This requires the production of a travel plan that facilitates modal shift to low carbon sustainable transport, as well as provision of appropriate level of electric vehicle charging points.

11.6.49 The proposed development is supported by a Travel Plan in accordance with Policy INF2. Measures and incentives have been put forward, as summarised in Section 11.5 to promote sustainable travel, including use of public transport, and reduce overall vehicle trips to ensure the requirements of Policy INF2 are met.

b) Robustness, timeliness and efficacy of mitigation

11.6.50 The principles of the IEMA Guidance are that where GHG emissions cannot be avoided, mitigation should be provided to minimise GHG emissions. Mitigation measures relating to airport emissions adopted by the airport are described for each airport source of the GHG footprint in Table 11-28 below.

Table 11-28 Summary of Mitigation by GHG source (excluding Aircraft Emissions)

Scope	GHG Emissions Source	Proposed Targets and Mitigation Measures adopted by LCY relevant to the proposed development
Scope 1	Natural gas consumption	LCY has set a target for the airport operations to become net zero by 2030 (Scope 1 and 2 emissions). Key mitigation measures identified include: - Fabric-first energy efficient design to minimise energy demand; - ASHP-led zero-emission heat solutions; - PV cells to provide on-site renewable electricity - Continued full procurement of renewable electricity and, exploring further solutions and partnership opportunities to increase use of renewable sources, including solar panels; - Work in partnership to reduce emissions from fire training and refrigerants where feasible adopt new technological solutions; - Continued upgrade of airside operational fleet to zero emissions technology; - Offset of any residual emissions through investment in high quality carbon offsets focussed on nature-based solutions under certified schemes. Where possible this will seek to support local projects and a new biodiversity fund has been committed through LCY's Roadmap[57].
	Airside Vehicles and Plant	
	Fire training activity	
	Refrigerant loss	
Scope 2	LCY electricity consumption (grid connection)	
Scope 3	Construction emissions	Best practice methods will be followed to reduce emissions from plant and machinery set out through the Proposed Development's Construction Environmental Management Plan (CEMP)
	Tenant grid electricity consumption	High energy efficiency for all CADP building areas to reduce energy demand and provision of PV cells on site will benefit LCY and tenants alike.
	3rd party airside vehicles and plant	Require 3rd party operators to invest in low emissions vehicle technology where feasible when seeking permission to operate new vehicles at the airport.
	LCY business travel	Remove the mileage allowance for staff using private cars for undertaking business travel where public transport, active travel and car share usage is possible.
	Waste management	Target for elimination of avoidable single use plastics by 2025. Target to achieve a 100% waste recycling rate by 2030.
	Staff Transport	LCY has set a target to be the best-connected airport in the UK with 80% of all journeys to the airport to be made by sustainable transport modes by 2030. Measures identified in the transport strategy include: - Carbon information on travel choices; - Working with DLR/TFL to extend hours/capacity; - Electric charging for passengers; and - Working towards direct connection to Elizabeth Line.
	Passenger Transport	

11.6.51 LCY has also committed to publish a detailed CCCAP within 6 months of grant of planning permission. This is consistent with similar commitments made at other airports that have recently received planning consent.

11.6.52 Appendix 11.3 provides an outline of the CCCAP.

11.6.53 Overall, the mitigation proposed is aligned with good practice for developments of this type. In terms of timeliness, LCY targets are to become a net zero airport by 2030 and zero emissions by 2040 (Scope 1 and 2). This is aligned with Government and London Mayor[66] targets and meets or exceeds the targets voluntarily set to date by other London airports.

Conclusion of Significance (Airport Emissions)

11.6.54 The assessment of significance of airport emissions has followed a 2-step process consistent with IEMA Guidance and is summarised below:

- In terms of context the net change in airport emissions as % of the 4th, 5th and 6th carbon budgets is 0.003, 0.004 and 0.001% respectively and is therefore very small. Importantly the contribution reduces between

[66] https://www.london.gov.uk/what-we-do/environment/climate-change/zero-carbon-london/pathways-net-zero-carbon-2030

the 5th and 6th carbon budgets, demonstrating alignment with the formal Government trajectory for economy decarbonisation;
- In terms of consistency with policy the proposed development's airport emissions are fully consistent with applicable existing and emerging policy requirements; and
- In terms of mitigation, the proposed development has adopted measures to mitigate airport GHG emissions that are in line good practice design standards for projects of this type.

11.6.55 Therefore, using IEMA's guidance (see Table 11-11) the assessment finds that the net change in airport GHG emissions from the proposed development is minor adverse, not significant.

Sensitivity Tests

11.6.56 The assessment of GHG emissions has also considered the two DC sensitivity tests: Faster Growth and Slower Growth, as described above and detailed in Chapters 3 and 4 of the ES. The effects of these two sensitivities are focused on the implications for aircraft emissions since those are the most significant source and most sensitive to passenger growth. It is not considered that airport emissions (Scope 1 and 2) would be materially different under the sensitivity scenarios for any year between 2024 and 2031.

11.6.57 Table 11-29 below summarises GHG emissions under the DC scenario and the faster and slower growth scenarios.

Table 11-29: Summary of Aircraft GHG emissions with DC and Sensitivity Scenarios

Scenario	Aircraft (CO_2e Tonnes)		
	2027	2031	2050
DC Scenario	344,090	374,727	34,381
Slower Growth	292,473	362,956	33,302
Faster Growth	368,641	373,694	34,286

11.6.58 Reference to Table 11-29 shows that in both the slower and faster growth scenarios that emissions in 2031 and 2050 are lower than in the core DC Scenario, which is therefore worst-case.

11.6.59 The lower emissions under the Slower Growth scenario are simply attributed to fewer ATMs relative to the core DC scenario in each assessment year, with the uptake of SAF and efficiency improvements not being felt until the 2030s. The lower emissions under the Faster Growth Scenario are driven by a more rapid rollover to newer aircraft, resulting in higher emissions in 2027 than the core DC Scenario, but slightly lower emissions from 2031 and beyond. In either case, the projections are indicative and demonstrate that the overall emissions do not materially differ regardless of the rate of transition to 9 mppa.

Non-CO_2 effects

11.6.60 As well as CO_2 emissions, aircraft also produce other emissions such as nitrogen oxides (NO_x), particulates and sulphates, and can cause water vapour to form into contrails (typically referred to as non-CO_2 emissions). These non-CO_2 emissions are considered by the DfT to potentially have a radiative forcing effect (contributing to climate change) if emitted at altitude, although guidance from the CCC and the DfT to date has been not to seek to quantify this effect for the purposes of environment assessment.

11.6.61 The potential warming effects from non-CO_2 emissions are uncertain and complex since aircraft produce a range of different pollutants that affect the climate in different ways. These include emissions that have a direct cooling effect on the climate, such as sulphates which reflect sunlight and induce low-level cloudiness, and those that have an overall warming effect on the climate, such as NO_x. Aircraft can also create contrails (long trails of cloud caused by ice crystal formation from soot particles when aircraft fly through supersaturated air) depending on the atmospheric conditions. As these clouds are high in the atmosphere, they have a relatively large warming effect on the climate, although that are short lived. There remains uncertainty

on the balance of all these effects and there is therefore no scientific consensus on the effect of non-CO_2 emissions at altitude at present.

11.6.62 On the issue of uncertainty, the Jet Zero Strategy states that "There are large uncertainties over the magnitude of non-CO_2 impacts on climate. Recent scientific evidence suggests the best estimate is that roughly two thirds of aviation's historical climate impacts are due to non-CO_2, and that, whilst non-CO_2 emissions can have both warming and cooling effects, the net warming rate is likely to be around three times that of CO_2. The uncertainties are real however: the non-CO_2 impacts of aviation on climate are **eight times more uncertain** than those resulting from CO_2".

11.6.63 The advice of the Committee on Climate Change (CCC) continues to be not to account for the radiative effects of non-CO_2 emissions at altitude until there is improved scientific evidence. Consequently, the CCC has therefore to date not provided any allowance for non-CO_2 effects from aviation in their advice on carbon budgets and as such there are no benchmarks against which to compare any non-CO_2 effects from the proposed development.

11.6.64 Notwithstanding the uncertainties relating to non-CO_2 effects the Jet Zero Strategy[25] has set the following policy commitments to manage non-CO_2 emissions:

- To continue to work with the scientific community and industry, including through the Jet Zero Council SAF Delivery Group, to increase understanding and evidence of the non-CO_2 impacts of using SAF blend flights;
- To work closely with atmospheric scientists, other researchers, industry and internationally to better understand the science and potential mitigations of non-CO_2 impacts from aviation; and
- To work with the CCC to explore their recommendation for no additional non-CO_2 warming from aviation after 2050 and to develop a methodology to monitor the non-CO_2 impacts from aviation on a regular basis.

11.6.65 The Jet Zero Strategy also commits government to explore expanding the UK-ETS to incorporate non-CO_2 effects, specifically in para 3.49 where it states that "We are exploring the potential for the UK ETS to go further in supporting the decarbonisation of aviation, including gathering evidence of the feasibility and appropriateness of expanding the scope of the UK ETS to incorporate non-CO_2 impacts, and the potential for further international cooperation with other emissions schemes such as the EU ETS and CORSIA."

11.6.66 Therefore, the conclusions reached in this assessment around the effectiveness of the UK ETS to limit aircraft emissions consistent with the in-sector trajectory would apply equally for non-CO_2 effects should their inclusion in the UK ETS be considered to be feasible and appropriate.

11.6.67 Furthermore, the Jet Zero Strategy also finds that research and analysis carried out thus far suggests that many of the measures to decarbonise aviation; improved aircraft efficiency, increased use of SAF, and the acceleration of zero emission flight are expected to also have a positive impact on reducing non-CO_2 impacts.

11.6.68 For example, the National Aeronautics and Space Administration (NASA)[67] and the German Aerospace Centre (DLR) showed that SAF can produce 50%-70% fewer soot particles, which could reduce the warming impact of contrails. Moving forward the Jet Zero Strategy commits to carefully consider the overall impact on the climate and adjust its policies as required.

11.6.69 Non-CO_2 emissions from aviation at altitude are also not included in the basket of gases covered by the Kyoto Protocol or the Climate Change Act, and consequently the CCC excludes these warming effects from consideration when setting carbon budgets.

11.6.70 For the reasons set out above the indirect (non-CO_2) effects of aviation have been excluded from the quantitative analysis of the proposed development and only the direct effects are taken into account when comparing emissions against the UK's carbon budgets and making judgements on significance.

[67] NASA Press Release: NASA-DLR Study Finds Sustainable Aviation Fuel Can Reduce Contrails: https://www.nasa.gov/press-release/nasa-dlr-study-finds-sustainable-aviation-fuel-can-reduce-contrails

11.6.71 Furthermore, it is clear that government through its Jet Zero Strategy policies is committed to supporting future research on improving technical understanding of non-CO_2 effects and the airport will monitor these developments through its CCCAP (see Appendix 11.3).

11.7 Further Mitigation and Monitoring

11.7.1 The UK aviation sector, through Sustainable Aviation and internationally through ICAO, has committed to net zero emissions by 2050. In meeting this commitment many airlines are already offsetting their emissions and more widely are subject to offsetting requirements under CORSIA and the UK ETS. The effect of these offsets has not been included in the assessment but will result in reducing net global emissions.

11.8 Residual Effects and Conclusions

11.8.1 Mitigation for GHG has been included in the main assessment of effects described earlier in this Chapter. The residual GHG effects are therefore set out as described in Paragraph 11.6.32 for aircraft emissions and in Paragraph 11.6.55 for airport emissions. The residual GHG effects for airport and aircraft emissions are therefore both minor adverse and not significant.

11.9 Assessment of Cumulative Effects

11.9.1 GHG emissions from all projects will contribute to climate change; globally, not just locally. As set out in the IEMA guidance[28], on page 21:

"Effects of GHG emissions from specific cumulative projects therefore in general should not be individually assessed, as there is no basis for selecting any particular (or more than one) cumulative project that has GHG emissions for assessment over any other".

11.9.2 This statement relates to 'cumulative' on a global scale. The definition of 'cumulative effects' in the context of GHGs and climate change therefore goes far beyond the typical definition of cumulative effects for EIA, which tends to focus on other proposed projects in the vicinity of the proposed development.

11.9.3 Chapter 3 of the ES has identified a number of cumulative schemes in the local area for consideration in the cumulative assessment. It is likely that each of these schemes, should they come forward in the future, would give rise to additional GHG emissions relative to the 2019 baseline conditions during both their construction and operation. However; as discussed above, cumulative contributions to climate change from GHGs will extend well beyond these schemes and the local area. It is expected that mitigation will be developed and implemented, principally for embodied carbon during construction and operational energy and transport, which are policy compliant and work to minimise the on-site GHG emissions and reduce the lifetime GHG emissions of each cumulative scheme.

11.9.4 Additionally cumulative emissions are managed through UK economy wide strategies such as the Government's Net Zero Strategy[24] and Transport Decarbonisation Strategy[23] .

11.9.5 With regard to cumulative aircraft emissions, the assessment of the significance of the proposed development's aircraft emissions has been undertaken with regard to the DfT's Jet Zero Strategy which sets a UK wide target for aircraft emissions and is therefore inherently cumulative.

11.9.6 In this respect the Jet Zero Strategy has had specific regard to the cumulative effect of UK expansion projects and which under the high ambition scenario would see airport passengers increasing by approximately 65% by 2050 relative to 2019[68] whilst meeting the in sector trajectory to net zero by 2050. The underlying airport capacity assumptions are detailed in the analytic dataset[68] and include for example:

- Growth at Heathrow through making better use of its runway and through a 3rd runway;

[68] See https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1061920/jet-zero-further-technical-consultation-dataset.ods

- London City airport growing to a capacity of 11mppa by 2030;
- Luton Airport growing to a capacity of 32mppa by 2030;
- Stansted airport growing to a capacity of 43mppa by 2030;
- Bristol Airport growing to 12mppa by 2030; and
- Leeds Bradford Airport growing to 7mppa by 2030.

11.10In-combination effects

11.10.1 Table 11-30 provides an assessment of potential changes to the findings of the GHG assessment, taking into account the predicted future conditions as a result of climate change, known as In-combination Climate Change Impacts (ICCI).

11.10.2 The assessment indicates that no additional mitigation is required.

Table 11-30: GHG in-combination climate change effects

Climate Hazard	Likely ICCI	Consequence of ICCIs considering embedded Environmental measures /good practice	Significance of ICCI effects
Increased summer temperatures	Increased energy required for cooling in buildings. Increased ambient temperatures which lowers air density and requires higher fuel consumption to increase thrust during take-off and climb.	Possible increase in GHG emissions requiring offsetting to be net zero	Negligible Not significant
Extreme weather events (including high winds)	Stronger winds and changing wind patterns might lead to modifications of flight lengths and routings, resulting in increase in the fuel consumption.	Possible minor increase in GHG emissions	Negligible Not significant

Conclusions

11.10.3 A summary of the significance of effects for GHG emissions is provided in Table 11-31.

Table 11-31 Summary of Likely Significant Effects

Receptor	Description of Effect	Duration	Geographical Extent	Scale and Nature (*if applicable)	Significant/ Not Significant
Global	GHG emission from airport construction and operation	Long term	Global	Minor Adverse	**Not Significant**
Global	GHG emissions from aircraft	Long term	Global	Minor Adverse	**Not Significant**

Part B: Resilience to Climate Change

11.11Baseline

11.11.1 The assessment of resilience of the proposed development to the impacts of climate change has been informed by regional scale information on historic and projected change in climate variables, and other studies undertaken in support of this planning application (such as the Flood Risk Assessment).

11.11.2 Baseline conditions have been defined by potential climate risks identified in the UK Climate Change Risk Assessment[69] and the Key Climate Projections: Headline Findings produced by the Met Office UK[70]. These are based on the 2018 UK climate projection dataset (UKCP18).

11.11.3 Table 11-32 sets out the current understanding of climate hazards affecting the airport, based on the assessments within the relevant technical chapters.

Table 11-32 Current Climate Change Hazards

Climate Hazard		Current Baseline
Higher Average Global Temperatures	Tidal Flooding/Sea Level Rise	The Flood Risk Assessment[71] identifies that the airport is in Flood Zone 3 and has a high probability of fluvial and tidal flooding from the River Thames; however the reach of the Thames benefits from flood defences which project against the 1 in 100 year fluvial and 1 in 200 year tidal flooding events. Overall, with the flood defences taken into account, the airport has a low risk of flooding, which corresponds to an annual risk of flooding between 0.1 and 1% (i.e. between once in 100 to 1000 years).
Wetter Winters	Fluvial Flooding	
	Surface Water Flooding	The Flood Risk Assessment outlines that the airport has a very low risk of surface water flooding based on Environment Agency flood risk maps. This corresponds with an annual flood risk from surface water of less than 0.1% (i.e. less than once in 1000 years).
	Groundwater Flooding	The Flood Risk Assessment identifies that the airport has potential for groundwater flooding of property situated below ground level. However, as the airport comprises above-ground buildings and infrastructure only, the groundwater flood risk can be considered significantly reduced.
Hotter, Drier Summers	Drought	The local area is not known to be suffering significant water stress. Thames Water operate a drought plan to prevent and limit the effects of serious drought in the area.
Extreme Weather Events	Storms (Wind and Rain)	Extreme weather events include heatwaves with temperatures exceeding 30 degrees Celsius, winter wind and rain storms and cold weather with snow and ice, have all been recorded in London in recent years. The airport has operational management plans in place for a number of these weather events, such as snow and ice, fog and high winds.
	Heatwaves	
	Snow and Ice	

11.11.4 There has been a significant human influence on the observed warming in the UK annual temperature since the middle of the 20th century. The CCC's UK Climate Change Risk Assessment[69] identifies that UK annual average land temperatures increased by 0.9°C between 1961-1990 and 2005-2014, with the majority of the warming occurring since 1970. There have also been increases in UK sea level rise, and heavy seasonal rainfall events have also increased.

11.12 Future Baseline

11.12.1 Climate modelling completed by the meteorological office (UKCP18)[72] out to 2100 is forecasting drier hotter summers, warmer wetter winters and more frequent extreme weather events due to climate change.

11.12.2 At the same time, higher levels of winter rainfall have been experienced often with increasingly heavy rainfall events leading to more flooding and damage to buildings and infrastructure. These patterns are

[69] CCC, (2017). UK Climate Change Risk Assessment 2017 Evidence Report.
[70] Met Office, (2019). UK Climate Projections: Headline Findings.
[71] RPS (2022) London City Airport Flood Risk Assessment.
[72] Met Office (2018) UK Climate Projections: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp

consistent with projections of more and heavier rainfall for the UK in a warmer global atmosphere. These changes increase health and safety risks to people and the built environment, increasing costs and disruption for repair and adaptation.

11.12.3 Table 11-32 identifies key climate hazards, which currently affect the airport and which are all considered within this assessment.

11.12.4 Information on predicted UK climate is taken from the UK Climate Projections where available. UKCP18 are the most up-to-date projections of climate change for the UK. The projections include probabilistic projections of a range of climate variables for different emissions scenarios, known as Representative Concentration Pathways (RCPs), over a range of time slices.

11.12.5 In this section, the central estimate (50th percentile) projections for high emissions scenario (RCP8.5) are presented. The high emissions scenario was used to adopt a 'worst-case' estimate of climate projections. These are summarised in Table 11-33. It should be noted that the worst-case time horizon for climatic projections is 2080-2099, however much of the assessment of the proposed development within this application focusses on the period of 2031 to 2050 and hence projections from UKCP18 for 2030 to 2049 are also presented.

Table 11-33 Climate Projections for London Based on UKCP18

Climate Variable	2030-2049 RCP8.5 (50th Percentile)	2080-2099 RCP8.5 (50th Percentile)
Mean Winter Rainfall	+10%	+23%
Mean Summer Rainfall	-9%	-41%
Mean Summer Temperature	+1.8º	+5.8º
Mean Winter Temperature	+1.2º	+3.5º
Sea Level Rise	0.1-0.4 m	0.5-1.1 m

11.12.6 Extreme weather events are also considered. Climate change predictions indicate increasingly erratic weather patterns that are likely to lead to extreme weather events.

11.12.7 The effect of the climate projections on the key climate hazards identified in Table 11-32 are summarised in the following sections.

Flooding

11.12.8 Increases in mean winter rainfall and extreme weather events including heavy winter rainfall is likely to increase the risk of flooding at the airport. Heavy and intense rainfall events increase the risk of surface water flooding from drainage system overload and prolonged wetter winters may increase groundwater flooding risk.

11.12.9 In terms of pluvial and tidal flooding, these risks are interrelated at the airport sits close to the River Thames within its tidal reach. These risks are increased by higher global average temperatures and warmer wetter UK winters forecast in the climate projections.

Droughts

11.12.10 According to UKCP18 projections, summer temperatures will increase, and summer rainfall will decrease leading to increase threat of drought affecting the London region.

Heatwaves

11.12.11 The UKCP18 projections forecast warmer, drier summers and more frequent extreme weather events which increases the likelihood of heatwaves and hot summer temperatures. This is likely to include longer periods of high ambient summer temperatures as well as higher extremes of summer temperature.

Wind and Storms

11.12.12 With regard to wind, there are no compelling trends in storminess, as determined by maximum gust speeds, from the UK wind network over the last four decades. UKCP18 projections over the UK show an increase in near surface wind speeds over the UK for the second half of the 21st century for the winter season when more significant effects of wind are experienced. This is accompanied by an increase in frequency of winter storms over the UK. However, the increase in wind speeds is modest compared to inter-annual variability. It is therefore foreseeable that the frequency of winter storms might increase in the future, but the intensity of the storms (i.e., maximum wind speeds) might not differ significantly to those experienced today.

Snow and Ice

11.12.13 UKCP18 projections identify that there will be a decrease in both falling and lying snow across the UK relative to the 1981-2010 baseline is expected by the end of the century. In general, the decreases are largest in low-lying regions such as London. However, the projections also identify and increase in extreme weather events (including snow and ice) so while the frequency and prevalence of winter snow and ice is likely to decrease in London, there remains a risk of extreme winter storm events which may include heavy snow and ice.

11.13 Scoping and Consultation

11.13.1 A formal scoping opinion has been provided by London Borough of Newham. Responses to the Scoping Opinion are provided in Table 11-6 in Part A of this Chapter, which covers comments relating to climate resilience where relevant.

11.14 Assessment Methodology

11.14.1 The assessment methodology takes into account the recommendations in the IEMA EIA guide to Climate Change Resilience and Adaptation[38] and has been adapted to ensure the assessment is proportionate to the proposed development.

Geographical Scope

11.14.2 The study area for climate resilience, unlike other disciplines, focuses on the impact that climate will have on the proposed development (as opposed to the impact of the proposed development on climate, which is assessed separately under Part A of this ES Chapter). The study area is, therefore, the boundary of the airport, split into its constituent parts (receptors).

11.14.3 The geographical scope of the climate projections that are used to define the future baseline are projections from UKCP18 for London.

Temporal Scope

11.14.4 The proposed development's planned lifetime will be a minimum of 60 years (consistent with typical assumed lifetimes for climate change assessment advised in guidance including PAS 2080[73]. IEMA guidance advises that UKCP18 for the 2080s be used to inform assessments, using the RCP 8.5 projections (high emissions scenario).

It is standard practice in EIA to distinguish between construction and operational effects of a development on the environment. This Climate Change assessment, however, is required to establish the likely significant effects of climate change on the proposed development. The focus of the assessment is, therefore, in the future when it is anticipated that changes from the existing climate will have occurred, and these may pose risks in relation to the operational function of the proposed development.

[73] Various, (2016). Publicly Available Standard (PAS) 2080 Carbon Management in Infrastructure. BSI.

11.14.5 The assessment does not explicitly consider climate risks during the construction period, since this will occur soon after grant of planning permission, will occur within a relatively short space of time, and thus risks associated with climate change can be managed through standard best practice measures.

11.14.6 Climate change by its nature occurs over many decades and future changes, as modelled by UKCP18, consider climate change in the 2050s and beyond. The focus of the assessment is, therefore, of the completed proposed development and the risks it may face due to future climate change in the context of design measures and airport operational measures that are adopted and any additional operational measures that may be required in the future.

Assumptions and Limitations

11.14.7 This assessment provides a broad indication of the potential impacts of climate change on the proposed development based on a qualitative assessment and professional judgement using knowledge of similar schemes.

11.14.8 The proposed development does not include any new buildings or infrastructure that are not already consented under the existing CADP planning permission. The climate resilience assessment therefore is aimed towards the proposed development in the form of the additional passenger throughput at the airport, but considers buildings and infrastructure where relevant to LCY's core business as a passenger airport.

11.14.9 UKCP18 provides probabilistic projections of future climate for a range of emissions scenarios. The UKCP18 projections are the most up-to-date projections of climate change for the UK. Future GHGs emissions, and resulting pathway of UK climatic changes (such as mean winter and summer temperatures and rainfall), is uncertain. A precautionary approach, consistent with IEMA guidance[38] has therefore been adopted here by selecting a high emissions scenario (RCP8.5) to identify the climate projections and evaluate the implications to known climate hazards (as evaluated in Paragraphs 11.12.8 to 11.12.13).

11.14.10 The design and operational climate adaptation measures are based on information provided by the project team and airport operational staff, based on current approaches and procedures implemented at the airport.

Method of Assessment

11.14.11 The assessment starts by establishing potential receptors, potential climate risks and considers the significance of that risk through an assessment of likelihood and consequence, taking into account the mitigation measures. As a further step the assessment identifies additional mitigation, as required, to address any significant effects and concludes on the residual risks.

11.14.12 The assessment is carried out over four-steps, as follows:

Step 1: Identify Receptors

11.14.13 During this stage, relevant receptors in the proposed development which may be affected by climate change (e.g. change in average weather conditions and extreme events) are identified.

Step 2: Identify Potential Impacts of Climate Change on Receptors and Confirm Mitigation

11.14.14 This stage comprises identification of potential impacts of changes in a range of climate variables on the receptors identified in Step 1. This is undertaken using professional judgement with reference to supporting literature, and identifies the design measures to mitigate the impacts.

Step 3: Assess the Significance of Effects of Climate Change on Receptors

11.14.15 This step assesses the significance of each hazard (using definitions in Table 11-36) based on scoring the likely consequence and likelihood of that hazard arising, using a five-point scale described in Table 11-34 and Table 11-35. The assessment of significance and scoring of likelihood and consequence are based on IEMA guidance[38].

Table 11-34 Qualitative Description of Consequence

Measure of Consequence	Description
Negligible	No damage to the proposed development, minimal adverse effects on health, safety and the environment or financial loss. Little change to service and disruption lasting less than one day.
Minor Adverse	Localised disruption or loss of service. No permanent damage, minor restoration work required: disruption lasting less than one day. Small financial losses and/or slight adverse health or environmental effects.
Moderate Adverse	Limited damage and loss of service with damage recoverable by maintenance or minor repair. Disruption lasting more than one day but less than one week. Moderate financial losses. Adverse effects on health or the environment.
Large Adverse	Extensive damage and severe loss of service. Disruption lasting more than one week. Early renewal of 50-90% of the proposed development. Permanent physical injuries and/or fatalities. Major financial loss. Significant effect on the environment, requiring remediation.
Very Large Adverse	Permanent damage and complete loss of service. Disruption lasting more than one week. Early renewal of the Development >90%. Severe health effects or fatalities. Extreme financial loss. Very significant loss to the environment requiring remediation and restoration.

Table 11-35 Qualitative Description of Likelihood

Measure of Likelihood	Description
Very High	The event occurs multiple times during the lifetime of the proposed development e.g., approximately annually.
High	The event occurs several times (approximately 12 events) during the lifetime of the proposed development.
Medium	The event occurs limited times (approximately 4 events) during the lifetime of the proposed development.
Low	The event occurs once during the lifetime of the proposed development.
Very Low	The event may occur once during the lifetime of the proposed development or may not occur at all.

11.14.16 These determinants are combined to assess the significance of effects on receptors, as shown in Table 11-36. The assessment is qualitative and uses expert judgment based on knowledge of similar schemes, engagement with the wider project team and a review of relevant literature.

11.14.17 The assessment of significance takes mitigation into account. Mitigation is identified through consultation with the Project Team including airport operational personnel.

Table 11-36 Significance of Effects Matrix

Likelihood of Hazard Occurring	Consequence of Hazard Occurring				
	Negligible	Minor Adverse	Moderate Adverse	Large Adverse	Very Large Adverse
Very High	Not significant	Significant	Significant	Significant	Significant
High	Not significant	Not significant	Significant	Significant	Significant
Medium	Not significant	Not significant	Not significant	Significant	Significant
Low	Not significant	Not significant	Not significant	Significant	Significant
Very Low	Not significant	Not significant	Not significant	Not Significant	Not Significant

Step 4: Establish Further Adaptation Measures and Determine Residual Effects

11.14.18 In the fourth step, further adaptation measures for any significant effects are identified through expert opinion based on knowledge of similar schemes and any residual effects of climate change on the receptors are assessed using the criteria set out in Table 11-34 to Table 11-36.

11.15 Assessment of Potential Effects

11.15.1 The assessment has followed the 4-step process identified earlier, as detailed further below.

Step 1: Identify Receptors

11.15.2 The key receptors identified for inclusion in the climate resilience assessment are:

- passengers;
- airport staff;
- airlines and aircraft;
- buildings and structures; and
- aprons, taxiways and runways.

Step 2: Identify Potential Impacts of Climate Change on Receptors and Embedded Mitigation

11.15.3 A number of potential impacts were identified which are inherent to the proposed development. These are detailed in Table 11-37 below.

Table 11-37 Climate Hazards and Mitigation

Climate Hazard	Receptor	Potential Impact	Design Measures to Mitigate Impacts
Flooding (including Sea Level Rise)	Passengers	Disruption to travel (delays and cancellation)	Tidal and pluvial flooding in the Thames and Docklands is managed by the Royal Docks Management Authority. Measures to prevent flooding at the airport include use of the Thames Barrier and adjustment to water levels in the Royal Albert and King George V Docks. The tidal defence level offered by the Thames Barrier (7.2 m) is above the level of the climate-change projected 1000-year flood water height of 6.94 m in 2100. Future upgrades to the barrier could be made to further reduce the risk of flooding in London from sea level rise. LCY own mobile flood protection barriers to mitigate areas of surface water flooding where they occur. These are principally deployed to protect electrical substations to prevent power disruption to the airport. The Environment Agency's Thames Estuary 2100 project has identified the need to replace and upgrade the lock gates on the King George V dock to protect against future climate related sea level rise; an upgrade was recommended in the next 40 years. Upgrades to airport infrastructure include higher capacity drainage systems (guttering and pipework) and stormwater capture to increase the ability of the airport buildings to drain away rainwater and prevent flash flooding.
	Aircraft and Airlines	Loss of business through aircraft grounding	
		Water damage to aircraft	
	Buildings and Structures	Water damage	
	Aprons, Taxiways and Runways		
Drought	Passengers	Water restriction/welfare/limited water supplies	LCY developing an extreme weather plan to guide operational procedures in the event of extreme weather including prolonged dry and hot periods. Ample water supplies to the airport and no historic issues with low supply or restrictions.
	Airport Staff		
	Aircraft and Airlines		
	Buildings and Structures	Damage from drying and shrinking of underlying soils	Buildings constructed with suitable foundations and no previous issues from dry spells of weather (e.g. summer 2022). Runways checked for damage or signs of weathering 4 times per day in a vehicle and once a week on foot to identify damage and rectify early.
	Aprons, Taxiways and Runways		
Heatwaves	Passengers	Heat stress	airport terminal areas air conditioned. Air conditioning system includes 4 chillers, but only 3 are needed so 1 is always available as backup.

Climate Hazard	Receptor	Potential Impact	Design Measures to Mitigate Impacts
			Full spring service of cooling and HVAC systems ahead of each summer. Rigorous maintenance regime to ensure fit for use. Inside temperature is dynamically controlled and linked to outside temperature to a) ensure temperature respite for passengers in the terminal and b) limit the stress on the air cooling system by targeting higher internal air temperatures when the ambient temperature is higher (e.g. at 25 degrees ambient, terminal air might be around 20 degrees, but at 40 degrees ambient, terminal air would be maintained at or above 25 degrees). Airport design to switch from nose out to nose into terminal/piers when on stand will reduce heat intensification from APUs when passengers board and disembark.
	Airport Staff		Airport developing an extreme heat plan with measures to adopt during high summer temperatures. Airside staff given 15 minutes break/heat respite every hour. Hydration plan and campaigns for airport staff including water access and cold/frozen drinks. Advice to staff on dealing with heat. Task management to minimise exposure to extreme heat (e.g. schedule outside tasks for early morning when air is cooler) or in areas when out of direct sunlight. Provision of hats and suncream to all staff working outside.
	Aircraft and Airlines	Inability to operate or damage due to extreme heat	Aircraft designed to operate under extreme temperatures and pressures and no known damage to aircraft from heat at LCY.
	Buildings and Structures	Fire	Watering of grass areas on airfield to prevent grass fire. Fire services on site and close connection to London Fire Services. Regular training for on-site fire service crews. All staff trained in fire evacuation and airside staff required to pass fire training.
	Aprons, Taxiways and Runways	Damage due to thermal actions	LCY developing an extreme weather plan to help deal with periods of extreme heat. Watering down of runway (particularly take of roll start points) to manage runway heat and prevent damage by aircraft. Watering is carefully planned to avoid thermal shock by rapid cooling of hot surfaces. Runways checked for damage or signs of weathering 4 times per day in a vehicle and once a week on foot.
Wind and Storms	Passengers	Disruption to travel (delays and cancellation)	When winds restrict runway operations (such as reduced arrivals) aircraft are typically delayed at their departure airport, and depart once conditions allow, to minimise cancellations or redirection to other airports. Advance storm warnings from the Met Office used by the airport to plan and prepare for storms to minimise disruption to services.
	Airport Staff	Unsafe working conditions	Aircraft refuelling ceased for safety during storms with threat of lightening.

Climate Hazard	Receptor	Potential Impact	Design Measures to Mitigate Impacts
	Aircraft and Airlines	Loss of business through aircraft grounding	Advance storm warnings from the Met Office used by the airport to plan and prepare for storms to minimise disruption to services. Aircraft can be routed around storms by air traffic control/NATS. Generator available for powering runway lighting to limit disruption in poor visibility/fog conditions.
		Wind damage to aircraft	Aircraft designed to withstand extreme pressures. Aircraft carefully inspected on arrival and prior to departure. Increase in larger aircraft as a result of the proposed development which hold up better in strong winds.
	Buildings and Structures	Loss of power to buildings and airport systems	Airport not reliant on above ground electrical cabling susceptible to damage by wind (supplies are buried). Management plans in place to deal with power failures should these occur, with focus on maintaining power or use of back-up generators for essential systems. New backup generators being installed at the airport, and upgrades to electrical infrastructure to improve resilience.
		Lightning strike	All buildings have lightening protection built into fabric of structures. Lightening protection annually maintained by a specialist company.
	Aprons, Taxiways and Runways	Wind damage and mechanical weathering	Cordon areas of wind damage to facades or structures and schedule rapid repairs. Flat roofs or low pitched roofs on most buildings and piers improves resilience to strong winds. Roofs pitched to south west in direction of prevailing winds.
			Increased airfield inspections during storms and gales. Winds have little effect on airfield infrastructure other than restrictions to operations.
Snow and Ice	Passengers	Disruption to travel (delays and cancellation)	LCY have a Winter Plan which sets out processes and procedures to minimise disruption due to poor weather in winter months and manage snow and ice. Aircraft and airfield snow clearance and de-icing is undertaken to keep airfield operational.
	Airport Staff	Injury from slips, trips and falls	LCY management receive advice from MetDesk system in relation to advisable grit salt use. Grit salt is applied to key infrastructure with passenger or staff foot traffic including walkways from car parks to the terminal. During snow conditions, some staff work from home to reduce number of airport staff on site.
	Aircraft and Airlines	Loss of business through aircraft grounding	Airfield staff trained for de-icing and ensure aircraft are de-iced prior to departure, and runways, aprons and taxiways are de-iced regularly. Airport have a fleet of snow ploughs used for runway and taxiway snow clearance as required. Aircraft allowed greater use of APUs in colder weather to maintain cabin air quality and essential aircraft systems.
	Buildings and Structures	Damage from freezing and thawing	Inspections of buildings and infrastructure. Safety cordon placed around any damage or locations with maintenance required and repairs quickly undertaken.

Climate Hazard	Receptor	Potential Impact	Design Measures to Mitigate Impacts
	Aprons, Taxiways and Runways		Regular snow clearance and de-icing of runways, taxiways and apron areas. Dedicated vehicle used to collect used de-icing fluid from aircraft stands to prevent build up.

Step 3: Assess the Significance of Effects of Climate Change on Receptors

11.15.4 Table 11-38 below details the assessment of climate risks identified in Step 2 above. This takes into account projections of future climate change described in Table 11-33 and mitigation designed into the proposed development.

Table 11-38 Climate Resilience Assessment

Climate Hazard	Receptor	Potential Impact	Likelihood	Consequence	Significance
Flooding (including Sea Level Rise)	Passengers	Disruption to travel (delays and cancellation)	Low	Minor Adverse	Not Significant
	Aircraft and Airlines	Loss of business through aircraft grounding	Low	Minor Adverse	Not Significant
		Water damage to aircraft	Very Low	Moderate Adverse	Not Significant
	Buildings and Structures	Water damage	Low	Minor Adverse	Not Significant
	Aprons, Taxiways and Runways		Low	Minor Adverse	Not Significant
Drought	Passengers	Water restriction/welfare/limited water supplies	Low	Minor Adverse	Not Significant
	Airport Staff		Low	Minor Adverse	Not Significant
	Aircraft and Airlines		Low	Minor Adverse	Not Significant
	Buildings and Structures	Damage from drying and shrinking of underlying soils	Low	Moderate Adverse	Not Significant
	Aprons, Taxiways and Runways		Low	Moderate Adverse	Not Significant
Heatwaves	Passengers	Heat stress	Low	Minor Adverse	Not Significant
	Airport Staff		Medium	Minor Adverse	Not Significant
	Aircraft and Airlines	Inability to operate or damage due to extreme heat	Very Low	Moderate Adverse	Not Significant
	Buildings and Structures	Fire	Very Low	Large Adverse	Not Significant
	Aprons, Taxiways and Runways	Damage due to thermal actions	Low	Moderate Adverse	Not Significant
			Medium	Moderate Adverse	Not Significant
Wind and Storms	Passengers	Disruption to travel (delays and cancellation)	High	Minor Adverse	Not Significant
	Airport Staff	Unsafe working conditions	Medium	Minor Adverse	Not Significant
	Aircraft and Airlines	Loss of business through aircraft grounding	High	Minor Adverse	Not Significant
		Wind damage to aircraft	Very Low	Moderate Adverse	Not Significant

Climate Hazard	Receptor	Potential Impact	Likelihood	Consequence	Significance
	Buildings and Structures	Loss of power to buildings and airport systems	Very Low	Moderate Adverse	Not Significant
		Lightning strike	Very Low	Large Adverse	Not Significant
	Aprons, Taxiways and Runways	Wind damage and mechanical weathering	Low	Minor Adverse	Not Significant
			Very Low	Minor Adverse	Not Significant
Snow and Ice	Passengers	Disruption to travel (delays and cancellation)	High	Minor Adverse	Not Significant
	Airport Staff	Injury from slips, trips and falls	Low	Moderate Adverse	Not Significant
	Aircraft and Airlines	Loss of business through aircraft grounding	High	Minor Adverse	Not Significant
	Buildings and Structures	Damage from freezing and thawing	Low	Minor Adverse	Not Significant
	Aprons, Taxiways and Runways		Low	Moderate Adverse	Not Significant

Step 4: Establish Further Adaptation Measures and Determine Residual Effects

11.15.5 Table 11-38 above shows that the are no significant effects and as such no additional mitigation measures are required.

Conclusions

11.15.6 A summary of the significance of the resilience of the Development to climate change is provided in Table 11-39.

Table 11-39 Summary of Likely Significant Effects

Receptor	Description of Effect	Duration	Geographical Extent	Scale and Nature (*if applicable)	Significant/ Not Significant
The Development	Resilience to climate change during construction and operation	Long term	Local	N/A	**Not significant**