



AIRPORT
EXPANSION

*EIA
SCOPING
REPORT*

*VOLUME 1
MAIN REPORT*

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Heathrow



Executive summary



EXECUTIVE SUMMARY

Heathrow Airport Limited ('Heathrow') proposes to remodel and expand the current two runway, four terminal, Heathrow Airport ('the Airport'). The expansion includes adding a third runway as well as associated development in the form of airport supporting facilities and airport related development.

There will be associated development both on and off airport, as well as transport infrastructure changes including modification of the M25 between junctions 14, 14a and 15 and the replacement and re-routing of local roads such as the A4 and A3044. The entirety of these works - the runway and associated development - is referred to as the Development Consent Order Project ('DCO Project') in this Scoping Report.

The DCO Project will increase the Airport's operating capacity limit by at least 260,000 air transport movements (ATMs) per year, rising from 480,000 (ATMs) per year¹ to at least 740,000 ATMs per year, and from around 76 million passengers per year (mppa) in 2016 to around 130mppa in the future.

The DCO Project is defined as a Nationally Significant Infrastructure Project (NSIP) under Sections 22 and 23 of the Planning Act 2008.

This Scoping Report has been produced to support a request by Heathrow for a written Scoping Opinion from the Secretary of State administered by the Planning Inspectorate (PINS), in relation to the DCO Project under Regulation 10 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('the EIA Regulations').

The components of the DCO Project are presented in this Scoping Report at a number of locations and in a range of design configurations. These design options were consulted upon in Heathrow's first public consultation on expansion, Consultation 1, undertaken between January and March 2018. The type and function of the components themselves are now well understood. The final locations and detailed design of the components are being refined with the aid of consultation feedback and ongoing stakeholder engagement, with Heathrow's local communities, airlines, and other interested parties.

The approach to defining the study area, baseline data gathering and methodologies for assessment of the likely significant effects described in this Scoping Report are not dependent on the final choice of precise location or detailed design of the components. The approach to environmental assessment, which is the focus of this Scoping Report does not rely upon precise component location or detailed design information being available.

Heathrow is seeking a Scoping Opinion from PINS at this stage to inform the preparation and completion of the Preliminary Environmental Information Report. This report will be published for comment alongside Heathrow's preferred masterplan as part of the Airport's

¹ The existing ATM limit of 480,000 was imposed on the grant of the T5 planning permission.



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second public consultation on expansion, Consultation 2, which is expected to be undertaken in early 2019. The Scoping Report is seeking an opinion on:

1. The environmental topics that should be included in the EIA
2. The relevant components of the DCO Project and the resultant likely significant effects
3. Those effects not likely to be significant that do not need to be considered further
4. The approach to setting the study areas for each topic
5. The data that has been gathered (and will be gathered)
6. The assessment methods that will be used to determine likely significant effects
7. The approach to determining the environmental measures that could be incorporated into the DCO Project to avoid, prevent, reduce or, if necessary, offset significant effects.

This Scoping Report also explains how the Environmental Statement (ES) will be structured and how consultees and other stakeholders have been and will continue to be engaged and involved in the development of the EIA.

Table 1 summarises the proposed scope of the assessment that will be presented by Heathrow in the Preliminary Environmental Information Report and ES, during both the construction and operational phases of the development.

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Table 1 Summary scope of the assessment ('x' denotes an aspect will be assessed).

Design component	Development Phase	Air quality	Biodiversity	Carbon and other greenhouse gases	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Runways and taxiways	Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Operation	X	X	X	X	X	X	X	X	X	X	X	X		X
Terminals and aprons	Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Operation	X	X	X	X	X	X	X	X	X	X	X	X		X
M25 motorway	Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Operation	X	X	X	X	X	X	X	X	X		X	X	X	X
Other road diversions	Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Operation	X	X	X	X	X	X	X	X	X		X	X	X	X
Public transport	Construction	X	X	X	X	X		X	X	X	X	X	X	X	X
	Operation	X	X	X	X	X	X	X	X	X		X	X	X	X
Rivers and flood storage	Construction	X	X	X	X	X		X	X	X	X	X	X	X	X
	Operation		X	X	X	X		X		X	X	X	X		X
Airport supporting facilities	Construction	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Operation	X	X	X	X	X	X	X	X	X	X	X	X	X	X



Chapter 1

Introduction



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1. INTRODUCTION

1.1 Purpose and structure of the Scoping Report

- 1.1.1 Heathrow Airport Limited ('Heathrow') proposes to remodel and expand the current two runway, four terminal, Heathrow Airport ('the Airport') by adding a third runway and associated development ('the DCO Project').
- 1.1.2 This Scoping Report supports a request by Heathrow for a written Scoping Opinion from the Secretary of State, administered by the Planning Inspectorate (PINS) on behalf of the Secretary of State, to inform the Environmental Impact Assessment (EIA) for the DCO Project.
- 1.1.3 The opinion of the Secretary of State is being sought specifically on:
1. The environmental topics that should be included in the EIA
 2. The relevant components of the DCO Project and the resultant likely significant effects
 3. Those effects not likely to be significant that do not need to be considered further
 4. The approach to setting the study areas for each topic
 5. The data that has been gathered (and will be gathered)
 6. The assessment methods that will be used to determine likely significant effects
 7. The approach to determining the environmental measures that could be incorporated into the DCO Project to avoid, prevent, reduce or, if necessary, offset significant effects.
- 1.1.4 This report has been produced in accordance with the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 ('The EIA Regulations'), having regard to relevant PINS Advice Notes.
- 1.1.5 The Scoping Report is provided in three volumes:
1. Volume 1 (this volume) – Main report
 2. Volume 2 – Figures
 3. Volume 3 – Appendices.
- 1.1.6 The remainder of this volume, Volume 1, is structured as shown in Table 1.1.



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Table 1.1 Scoping Report structure

Chapter	Detail
Chapter 1 – Introduction	Sets out the structure of this Scoping Report, the background to the development of the DCO Project, the need for an EIA, the EIA and the Scoping Report, the other assessments to be undertaken, the main alternatives considered, and the policy background.
Chapter 2 – Description of the existing site and its surroundings	Describes the site and its current uses. Describes the surrounding land and land uses.
Chapter 3 – The DCO Project	Describes the components of the DCO Project for EIA scoping purposes, including the main alternatives considered as well as a more detailed description of the proposals.
Chapter 4 – Approach to EIA Scoping	Summarises the approach to identifying the scope of the assessment including an introduction to the methods used.
Chapters 5 to 18 – Technical topic chapters	Outlines the proposed scope of the assessment for each technical topic, the baseline data collected, the approach to setting the study area and the proposed methodology for assessment.
Chapter 19 – Outline structure of the Environmental Statement	Provides an outline of the proposed Environmental Statement structure.
Chapter 20 – Glossary and list of abbreviations used in this report	Provides a list of terms and abbreviations used in this report.

1.2 Background

- 1.2.1 The new runway will enable an increase in operating capability of at least 260,000 air transport movements (ATMs) per annum, increasing the Airport's capacity from 480,000 ATMs per annum¹ to at least 740,000 ATMs per annum, and from around 76 million passengers per annum (mppa) to around 130 mppa.
- 1.2.2 The DCO Project includes changes to the infrastructure and facilities surrounding the current operational Airport, as well as major changes to the M25 and the motorway junctions serving the Airport, replacing and re-routing local roads such as the A4 and A3044 and alterations to the water environment in the Colne Valley. Other development to ensure the expanded Airport can operate successfully also forms part of the DCO Project, including supporting and related facilities such as aircraft maintenance, aviation fuel storage and car parking.

¹ The limit of 480,000 ATMs per annum was imposed on the grant of the T5 planning permission.



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- 1.2.3 The DCO Project will be constructed in a series of phases, with the new runway expected to open by a target date of 2026 and the scheme to be built out in line with demand and expected to be fully developed by a target date of 2035.
- 1.2.4 The DCO Project is defined as a Nationally Significant Infrastructure Project (NSIP) under the terms of Section 22 (for works to the M25) and Section 23 (for the increased capability facilitated by the new runway and terminals) of the Planning Act 2008. The revised draft Airports National Policy Statement ('revised draft ANPS'), once designated, and the National Policy Statement for National Networks (NN NPS), will apply to the DCO Project, as explained in Section 1.3: National airport infrastructure and Section 1.9: Policy.
- 1.2.5 The necessary components of the DCO Project (for example, the runway, taxiways and road diversions) required to deliver the expansion of Heathrow are presented in this Scoping Report at a number of locations or design configurations. These were consulted upon in Heathrow's first public consultation on the scheme, Consultation 1, undertaken between January and March 2018. The components themselves are well determined, and their final locations and detailed design are being refined. The approach to setting the study area, data gathering and methodologies for assessment of likely significant effects described in this Scoping Report are applicable regardless of the final choice of location or detailed design options for each of the components. As such it is considered appropriate to seek a Scoping Opinion at this stage to inform the Preliminary Environmental Information Report (PEIR) for the DCO Project. Heathrow may seek a further Scoping Opinion if it is considered necessary in light of further scheme development and consultation.

1.3 National airport infrastructure

- 1.3.1 London and the South-East are facing long term airport capacity problems, with the runways at Heathrow Airport already operating at capacity, and Gatwick Airport operating at capacity at peak times. The whole London airports system is forecast to be full by the mid-2030s.
- 1.3.2 The Government therefore set up the Airports Commission in 2012 with its objective being to determine how the UK could maintain its position as Europe's most important aviation hub. The Airports Commission concluded in 2015² that the solution to meet this objective was a new north-west runway at Heathrow. In reaching its conclusion, the Airports Commission indicated that a substantial package of measures to address the environmental and community effects of expanding Heathrow would be required.

² Airports Commission, Airports Commission: Final Report, July 2015



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- 1.3.3 Following a period of review and further analysis, the Government announced a new north-west runway at Heathrow as its preferred scheme and location for expanding airport capacity in the South-East.
- 1.3.4 In February 2017, the Government published a first draft Airports National Policy Statement ('the first draft ANPS') for consultation, confirming the Government's preference for a new north-west runway at Heathrow and setting out the policies to be applied in determining any future application through the DCO process. A revised version of the first draft ANPS was published in October 2017 for further consultation. It superseded the first draft ANPS and is referred to throughout this Scoping Report as the 'revised draft ANPS'.
- 1.3.5 Heathrow is a critical part of Britain's national infrastructure and is the UK's only hub airport. The Airport currently serves 194 routes to more than 80 countries, connecting the UK to the rest of the world. However, the current airport is operating at maximum capacity and unless it is expanded cannot enable Britain to connect to growing international economies.

1.4 The need for an Environmental Impact Assessment

- 1.4.1 EIA is a process required by UK law which brings together information about the likely significant effects of a development. The legal basis for EIA lies in European Community Directive 85/337/EEC³ (the 'EIA Directive'). The EIA Directive is transposed into UK law through several pieces of legislation.
- 1.4.2 In relation to NSIPs, EIA is required for certain developments under the EIA Regulations.
- 1.4.3 The stages of the DCO EIA process include:
1. Screening (discretionary)
 2. Scoping (discretionary) (this stage)
 3. Preparation of a PEIR
 4. Preparation of an Environmental Statement (ES).
- 1.4.4 The DCO Project falls within paragraph 24 of Schedule 1 to the EIA Regulations, which refers to:

“Any change to or extension of development listed in this Schedule where such a change or extension in itself meets the thresholds, if any, or description of development set out in this Schedule.”

³ As amended by Directive 97/11/EC, 2003/35/EC, 2011/92/EU and 2014/52/EU.



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- 1.4.5 Paragraph 7(1) of Schedule 1 to the EA Regulations refers to:
- “Construction of lines for long distance railway traffic and of airports with a basic runway length of 2,100 metres or more”.*
- 1.4.6 The extension of the Airport with a new runway with a basic runway length of 2,100 metres or more meets the thresholds and description of development within this paragraph 7(1) and therefore falls within paragraph 24.
- 1.4.7 Other infrastructure elements which form part of the DCO Project would also, on their own, likely constitute development for which the requirement to undertake EIA would apply. For example, the proposed highway development is expected to fall within paragraph 7 (2) of Schedule 1 to the EIA Regulations, which refers to:
- “Construction of motorways and express roads”*
- 1.4.8 A change to or extension of the motorway meets the description of development in paragraph 7(2), and so meets the requirements of paragraph 24 of Schedule 1 to the EIA Regulations.
- 1.4.9 As such, an EIA will be prepared in respect of the DCO Project, in support of the DCO application.
- 1.4.10 A screening opinion (Stage 1) to determine whether EIA was required has not been sought in relation to the DCO Project as it is clear that it falls within Schedule 1, and that an EIA is therefore required. The Secretary of State has been notified in writing, pursuant to Regulation 8(1) (b) of the EIA Regulations that Heathrow proposes to make an application for development consent for the DCO Project and to provide an ES in respect of the DCO Project.

1.5 EIA scoping and the Scoping Report

- 1.5.1 Regulation 10(3) of the EIA Regulations defines the information that must be provided when a Scoping Opinion request is made, namely:

- “(a) a plan sufficient to identify the land;*
- (b) a description of the proposed development, including its location and technical capacity;*
- (c) an explanation of the likely significant effects of the development on the environment; and*
- (d) such other information or representations as the person making the request may wish to provide or make.”*



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- 1.5.2 PINS Advice Note Seven⁴ provides further advice on timing of scoping, content of scoping reports and approach to consultation.
- 1.5.3 This Scoping Report has been prepared to satisfy this element of the EIA Regulations and is in line with PINS Advice Note Seven. Further details are provided in Tables 4.1 and 4.2 in **Chapter 4: Approach to EIA scoping**.

1.6 Competence

- 1.6.1 Regulation 14(4) of the EIA Regulations requires that an ES is prepared by 'competent experts' and that the ES is accompanied by a statement outlining the relevant expertise or qualifications of such experts.
- 1.6.2 This Scoping Report has been co-ordinated by environmental consultants who are members of the Institute of Environmental Management and Assessment's (IEMA) EIA Quality Mark scheme. The Quality Mark requires its members to provide evidence of their EIA activities and adhere to certain commitments set out by IEMA. IEMA carry out an independent audit of those commitments each year by reviewing the ES's produced by Quality Mark members.
- 1.6.3 Senior experts from Heathrow have also contributed to the development of this Scoping Report and the Heathrow Expansion Leadership Team have governed the production of the report and approved its submission to PINS.
- 1.6.4 Competent experts have also been responsible for preparing topic specific chapters of this Scoping Report and further details of their expertise and qualifications are provided in **Appendix 1.1 Competent experts involved in the Scoping Report**.

1.7 Other assessments

- 1.7.1 In addition to the EIA, the preparation of the DCO application for the DCO Project requires other standalone assessments to be carried out to meet the requirements of other policy and legislation. Whilst the outcomes of these assessments may be drawn upon when carrying out the EIA (and vice versa), the scope of these other assessments will be discussed and agreed with appropriate regulatory authorities in line with the requirements of the relevant policy and legislation, rather than within this Scoping Report.
- 1.7.2 Where appropriate, however, the individual topic chapters in this Scoping Report outline where the findings of one of the additional assessments are to be drawn upon when carrying out the EIA, and any proposed scope of the relevant

⁴ Planning Inspectorate, Advice Note Seven: EIA: Process, Preliminary Environmental Information and Environmental Statements. Version 6, December 2017



additional assessment is set out to facilitate consultation with relevant consultees in relation to this Scoping Report.

Airspace change process

- 1.7.3 Any changes to the procedural design of the airspace around Heathrow (i.e. flight paths) cannot be consented under the DCO. Required changes to airspace design will be consented via submission of an Airspace Change Proposal to the Civil Aviation Authority (CAA) in accordance with the Airspace Change Process (ACP)⁵.
- 1.7.4 In the UK, the CAA is the independent aviation regulator, which under Section 66 of the Transport Act 2000 has several responsibilities including approving any changes to UK airspace. Approval of changes to airspace is dependent on a number of factors, set out in Section 70 of the Transport Act 2000, including safety, security and environmental considerations.
- 1.7.5 Guidance to airports is provided in the CAA’s publication *CAP1616: Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements*⁶. The CAA in carrying out its air navigation functions, and the wider industry (including airport operators like Heathrow) in the course of their operations, are guided by the Government’s *Air Navigation Guidance 2017*⁷. It is this document that sets the environmental objectives in relation to airspace design and air navigation.
- 1.7.6 It is anticipated that an ACP approval will be obtained 18 – 24 months after the DCO is made (assuming approval by the Secretary of State of the DCO application). The relationship between the DCO process and ACP is recognised in paragraph 5.49 of the revised draft ANPS:

“The Airports Commission’s assessment was based on ‘indicative’ flight path designs, which the Government considers to be a reasonable approach at this stage in the process. Precise flight path designs can only be defined at a later stage after detailed airspace design work has taken place. This work will need to consider the various options available to ensure a safe and efficient airspace which also mitigates the level of noise disturbance. Once the design work has been completed, the airspace proposal will be subject to extensive consultation as part of the separate airspace decision making process established by the Civil Aviation Authority.”

⁵ Civil Aviation Authority, CAA Publication 1616: Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, December 2017

⁶ Civil Aviation Authority, CAA Publication 1616: Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, December 2017

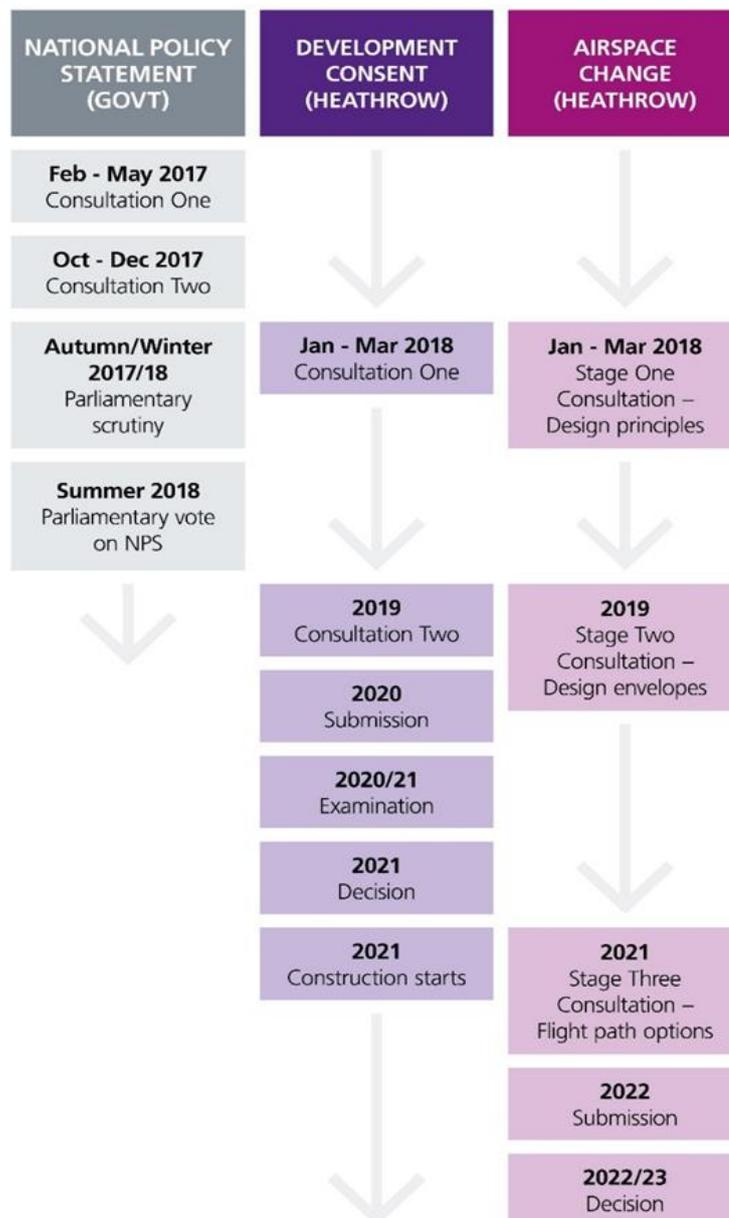
⁷ Department for Transport, Air Navigation Guidance 2017: Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management, Moving Britain Ahead, October 2017



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1.7.7 Given the timing of the ACP, shown in Graphic 1.1, it will be necessary to make certain informed assumptions about the airspace design, as anticipated in the revised draft ANPS, based on the developing airspace design. These assumptions will inform the development of indicative flight path designs to be used in the assessment of likely significant environmental effects of flights from an expanded Heathrow in the ES that accompanies the DCO application.

Graphic 1.1 Indicative timeline of Airspace Change process and DCO process





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- 1.7.8 The assessments in the ES will therefore be based on indicative flight path designs, consisting of (i) design envelopes indicating the geographical areas within which flight paths will likely be and (ii) prototype routes within these envelopes, which will likely be operationally viable flight path options. These will represent the best estimates of future flight paths available at the time of the DCO application.
- 1.7.9 Although there will not at that stage be confirmed flight paths, there will be a higher certainty of route location closer to the runways.
- 1.7.10 It is the subsequent ACP that will determine the final flight paths for the expanded Airport, which includes a process of consultation and environmental assessment.
- 1.7.11 To ensure that the DCO and ACP processes operate effectively they will be co-ordinated but kept separate throughout, with the ACP (not the DCO) responsible for designing the airspace.
- 1.7.12 This approach is anticipated in the revised draft ANPS, and has also been discussed with both PINS and the CAA. Further work is underway to ensure both parties receive the information they require to consider the respective DCO and ACP submissions.

1.8 Main alternatives considered

- 1.8.1 Schedule 4 to the EIA Regulations states that an ES should include:

“a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects”.

- 1.8.2 This requirement is reiterated in the revised draft ANPS (paragraph 4.28). Whilst there is no statutory requirement to include an assessment of alternatives in support of a request for a Scoping Opinion, PINS Advice Note Seven recommends that a Scoping Report includes “an outline of the reasonable alternatives considered and the reasons for selecting the preferred option”. Section 3.1: Project design therefore provides further information on the consideration of design options as reasonable alternatives in the context of the DCO Project.

1.9 Policy

- 1.9.1 This section outlines the key national and local planning policies against which the DCO application for the DCO Project will be assessed. It also identifies the relevant site-specific planning policy designations and allocations.



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- 1.9.2 Where relevant to the scope of the assessment, international obligations relating to particular environmental topic assessments (for example policy relating to climate change) are covered in the individual topic chapters 5 to 18.

National planning policy

- 1.9.3 The revised draft ANPS was published in October 2017, and identifies the issues that the Secretary of State is required to consider in determining the application for development consent and defines the likely requirements for the ES which will support the application. The final ANPS is expected to be designated following Parliamentary scrutiny and a vote before the end of the first half of 2018⁸, well in advance of the submission of a DCO application for the DCO Project.
- 1.9.4 Once designated, the ANPS will provide the principal planning policy to be applied in determining the DCO application for the DCO Project.
- 1.9.5 The National Policy Statement for National Networks (NN NPS) (December 2014) is also relevant because the DCO Project includes highway development, which is covered by the NN NPS. The revised draft ANPS makes clear that surface access proposals which meet the thresholds to qualify as a NSIP under the Planning Act 2008, will be considered against both the NN NPS and the revised draft ANPS, as appropriate⁹. The revised draft ANPS is clear that if there is conflict between the revised draft ANPS and another National Policy Statement (NPS), the conflict should be resolved in favour of the NPS that has been most recently designated¹⁰.
- 1.9.6 The National Planning Policy Framework (NPPF) (March 2012) is also a relevant policy consideration for the DCO Project. Whilst the final ANPS will be the primary policy for determining any application for the DCO Project, it states that policy set out in the NPPF should be taken into account in relation to a number of environmental topics (for example, noise, biodiversity and ecology, flood risk and land instability). A draft revised NPPF was published for consultation on 5 March 2018¹¹, and the consultation closed on 10 May 2018. Whilst the proposed amendments to the NPPF are therefore in draft at this stage, the Government has indicated it intends to publish a final version in the summer of 2018, at which point the revised version will replace policy set out the current NPPF (March 2012).
- 1.9.7 Although not planning policy, the Airports Commission's Final Report was the culmination of a rigorous independent process and provides context for the

⁸ HC Deb 07 September 2017 vol 628 c WS119

⁹ Para 4.7, Revised draft ANPS, October 2017

¹⁰ Para 4.8, Revised draft ANPS, October 2017

¹¹ Ministry of Housing, Communities and Local Government National Planning Policy Framework Consultation Proposals, Ministry of Housing Communities and Local Government, March 2018



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preparation of the ANPS and therefore is relevant to this request for a Scoping Opinion.

Airports National Policy Statement

1.9.8 Paragraph 4.3 of the revised draft ANPS explains how it applies to the Airport:

“The Airports NPS applies to schemes at Heathrow Airport (in the area shown within the illustrative scheme boundary map at Annex A) that include a runway of at least 3,500m in length and that are capable of delivering additional capacity of at least 260,000 air transport movements per annum, and associated infrastructure and surface access facilities. In particular, it also applies to the reconfiguration of and provision of new terminal capacity to be located between the two existing runways at Heathrow Airport”

1.9.9 Annex A referred to in the revised draft ANPS is reproduced in Figure 1.1.

1.9.10 The revised draft ANPS also includes a layout plan (at Annex B), derived from the work of the Airports Commission, which provides an illustration of how a future expanded Heathrow might be developed. This is reproduced in Figure 1.2.

1.9.11 The Airports Commission recognised that the DCO Project would necessarily evolve through the planning process in response to consultation, design detailing and on-going assessment, including environmental assessment.

1.9.12 Paragraph 4.11 explicitly states:

“While the Government has decided that a North-west Runway at Heathrow Airport is its preferred scheme to deliver additional airport capacity (an illustrative masterplan is at Annex B of the Airports NPS), this does not limit variations resulting in the final scheme for which development consent is sought. To benefit from the full support of policy within the Airports NPS any application(s) will have to fall within the boundaries and parameters set out in the Airports NPS. However, the form of a development for which an application made is a matter for the applicant.”

1.9.13 Whilst the revised draft ANPS may be subject to further amendment through consultation and parliamentary scrutiny, it sets out policy principles which are important in forming the masterplan for the DCO Project and which are not expected to materially change in the final ANPS. Key considerations raised by the revised draft ANPS include the following:

1. A new runway to the north-west of Heathrow is expected to be at least 3,500m in length and capable of delivering additional passenger capacity of at least 260,000 ATMs per annum, taking the capacity of Heathrow to at least 740,000 ATMs (paragraph 4.3)
2. The scheme is expected to include associated infrastructure and surface access facilities, including changes to the M25, local road diversions and



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transport infrastructure necessary to support the increased number of people who will need to access the expanded network and to achieve a public transport mode share of at least 50% by 2030 and 55% by 2040 (paragraphs 5.11 and 5.16)

3. An application should identify existing and proposed land uses near the expanded airport, including any effects of replacing existing development or uses – in this context it is notable that the illustrative masterplan included within Annex B of the revised draft ANPS includes proposals for cargo, parking, environmental mitigation and a range of airport supporting facilities (paragraph 5.110).

1.9.14 The revised draft ANPS also sets out some general principles for EIA which are important in forming the approach to scoping. These are set out in Section 4 (Assessment principles) of the revised draft ANPS and include:

1. The Examining Authority should ensure that likely significant environmental effects at all stages of the DCO Project have been adequately assessed (paragraph 4.13)
2. The effects of any changes in operations, including the number of air traffic movements, during the construction and operational phases must be properly assessed and mitigation secured for any significant effects (paragraph 4.13)
3. The ES should consider cumulative effects, and should provide information on how the effects of an applicant's proposal would combine and interact with the effects of other development (paragraph 4.14).

1.9.15 The revised draft ANPS also sets out important policies for good design, to limit and mitigate community impacts and impacts relating to matters such as noise, air quality, flood risk and ecology – all of which need to be considered in detail as part of the development of the masterplan for the DCO Project.

1.9.16 Section 4 of the revised draft ANPS also explains how matters such as the Conservation of Habitats and Species Regulations 2017, Equality Act 2010, alternatives, costs, climate change adaption, pollution control and other environmental protection regimes, nuisance, security considerations, health and accessibility should be addressed.

1.9.17 Section 5 (Assessment of impacts) sets out how the applicant should undertake its assessment, the approach and, in some cases, targets for mitigation and considerations for decision making in respect of environmental topics. These include surface access, air quality, noise, carbon emissions, biodiversity and ecological conservation, land-use and green infrastructure, Home Office Assets, resource and waste management, flood risk, water quality and water resources, historic environment, landscape and visual impacts, land instability, dust, odour,



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artificial light, smoke and steam, community compensation, community engagement and skills.

- 1.9.18 The requirements of the revised draft ANPS in relation to environmental assessment are described in more detail in the individual topic chapters of this Scoping Report.

Local planning policy

- 1.9.19 Much of the DCO Project site and land surrounding it are located within Greater London. The Mayor of London is responsible for preparing the spatial development strategy for the Greater London area, namely the London Plan (most recently adopted in March 2016 and draft replacement published in December 2017).
- 1.9.20 The adopted London Plan (March 2016) includes aviation policy for London (Policy 6.6 Aviation), which acknowledges the need for adequate airport capacity to serve a wide range of destinations and maintain London's competitive position in a global economy, whilst opposing further expansion of Heathrow. The draft new London Plan (December 2017) includes updated policy relating to London's airports (draft Policy T8 Aviation), which states that the Mayor will only support expansion at Heathrow if it meets certain environmental and community-related requirements. Principal policy matters will be set out by the Government in the final ANPS once designated. However, the adopted London Plan, where relevant and provided it does not conflict with the final ANPS, will be a material consideration in determining the application.
- 1.9.21 At the local level, planning policy is set by a number of Local Planning Authorities (LPAs). The existing operational areas of the Airport fall within the London Borough of Hillingdon, but there are eight other LPAs near the Airport (within 4km or less). A plan indicating the administrative boundaries surrounding Heathrow is provided at Figure 1.3.
- 1.9.22 The relevant planning policy documents published by these LPAs are identified in Table 1.2.



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Table 1.2 Relevant planning policy documents

Local planning policy	Adopted development plan documents	Emerging development plan document
London Borough of Hillingdon	Local Plan Part 1 (adopted November 2012) (2012-2026) Unitary Development (1998) Saved Policies West London Waste Plan (2015)	Local Plan Part 2: Draft Site Allocations (October 2015) Local Plan Part 2: Development Management Policies (October 2015)
London Borough of Hounslow	Hounslow Local Plan 2015 to 2030 Volume One and Volume Two West of Borough Local Plan Review (October 2017) West London Waste Plan (2015)	-
London Borough of Ealing	Development (Core Strategy) Development Plan Document (DPD) (April 2012) Development Sites DPD (December 2013) Development Management DPD (December 2013) West London Waste Plan (2015)	-
London Borough of Richmond Upon Thames	Saved Unitary Development Plan (2005) Policies Core Strategy (April 2009) Development Management Plan (November 2011) West London Waste Plan (2015)	Emerging Local Plan Review (publication version May 2017)
The Royal Borough of Windsor and Maidenhead	Saved Policies of Local Plan (June 2003) The Replacement Minerals Local Plan (incorporating the alterations adopted in December 1997 and May 2001) The Waste Local Plan for Berkshire (adopted December 1998)	Draft Local Plan (Submission Version September 2017)
Spelthorne Borough Council	Saved Policies of Local Plan (2001) Core Strategy and Policies (2009) Spelthorne Allocations Development Plan Document (2009) Surrey Waste Plan 2008 Surrey Minerals Plan 2011 Joint Aggregates Recycling DPD for the Minerals and Waste Plans 2013	-



Local planning policy	Adopted development plan documents	Emerging development plan document
Slough Borough Council	Core Strategy 2006-2026 Site Allocations DPD (November 2010)	Emerging Local Plan Issues and Options (2016-2036)
Runnymede Borough Council	Saved Policies of Local Plan (2001) Surrey Waste Plan 2008 Surrey Minerals Plan 2011 Joint Aggregates Recycling DPD for the Minerals and Waste Plans 2013	Emerging 2030 Local Plan
South Bucks District Council	Saved policies Adopted Local Plan (1999) Core Strategy (2011) Buckinghamshire Minerals and Waste Local Plan 2004-16 Buckinghamshire Minerals and Waste Core Strategy 2012	Emerging Chiltern and South Bucks Local Plan (2014-2036) Issues and Options (2016) and Green Belt preferred options (2016)

- 1.9.23 The topic chapters describe local planning policy where it is relevant to their assessment.

Local designations

- 1.9.24 As with the London Plan, Local Plans do not set policy for nationally significant infrastructure such as a new runway. Local policy designations such as Green Belt and heritage or ecology designations are important in determining consent, but principal policy is set out by the Government in the revised draft ANPS.
- 1.9.25 Local Plans include general policies (for housing, employment, transport, the environment, etc.) and ‘designations’ of land represented on maps, commonly known as ‘policies maps’.
- 1.9.26 Each of the LPAs referred to above has prepared an adopted policies map, which shows the planning policy designations that currently apply to the Airport and its surroundings. A consolidated plan of adopted LPA policies maps has been prepared and provided in **Appendix 1.2: Adopted local planning authority policies**.
- 1.9.27 Some LPAs have begun to prepare new draft policies maps, and these are shown in **Appendix 1.3: Draft and emerging local planning authority policies**.
- 1.9.28 The consolidated maps show the current and emerging planning constraints and designations around the Airport. A considerable amount of the land near the Airport which is not currently developed is designated as Green Belt or has a form



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of environmental designation. Other designations include policies from the local planning authorities for housing development and employment.

- 1.9.29 The LPAs are required to review their Local Plans from time to time to keep them up to date. In particular, the NPPF requires each LPA to plan to meet its forecast housing and employment needs. Whilst the revised draft ANPS, once designated, will set out the primary policy in accordance with which the DCO application will be determined, local planning policy where relevant will identify local policy designations and will be a material consideration.



Chapter 2

Description of the existing site and its surroundings



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2. DESCRIPTION OF THE EXISTING SITE AND ITS SURROUNDINGS

2.1 Surroundings

- 2.1.1 Heathrow is a two runway, four terminal (Terminals 2, 3, 4 and 5) airport situated to the west of London in the London Borough of Hillingdon. The current planning boundary of the Airport is shown on Figure 2.1 and covers an area of approximately 1,200ha.
- 2.1.2 The Airport is broadly bounded to the north by the A4, to the west by the A3044, to the east by the A30 and to the south by the Duke of Northumberland's River and smaller connecting roads. Approximately 600m from the western perimeter of Heathrow lies the M25, with a direct link to Terminal 5 (T5) and the perimeter road from Junction 14a. To the north of the Airport lies the M4, which provides an additional direct link to the Airport's central terminal area and the perimeter road from Junction 4.
- 2.1.3 The Airport sits in two main river catchments, namely the catchment of the River Colne in the west and of the River Crane to the east. It is bounded by a number of associated watercourses west of the Airport – these include the River Colne, the Colne Brook and the Wraysbury River. In addition, the Duke of Northumberland's River and the Longford River flow around the Airport's western and southern boundaries. To the west and south of the Airport are a series of drinking water reservoirs supplying London, namely the Queen Mother, Wraysbury, King George VI and Staines Reservoirs.
- 2.1.4 The Airport lies within a semi-urban area with several settlements bordering the perimeter. Longford, Harmondsworth, Harlington and Sipson villages lie to the north, Poyle and Colnbrook to the west while Stanwell Moor, Stanwell, Hatton and East Bedfont lie to the south. Cranford village is situated to the east. Despite the largely urban nature of its immediate surrounds, to the north-west, south-west and west of the Airport the surroundings become much less developed and are more rural in nature.
- 2.1.5 As such, there are large areas of open land within a short distance of the Airport to the west, notably Staines Moor, part of which is also designated as a Site of Special Scientific Interest, and the Colne Valley Regional Park. The area is also widely used for minerals extraction with several areas of current and past mineral workings. Many of these have been historically landfilled and restored to farmland or as nature reserves, such as Harmondsworth Moor, and allow public access.



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EIA Scoping Report – Chapter 2: Description of the existing site and its surroundings

2.2 Existing infrastructure

Runways

- 2.2.1 Heathrow has two runways: the northern runway is 3,902m long while the southern runway is 3,660m long. Both are oriented east – west.
- 2.2.2 The preferred mode of operation is for arriving and departing aircraft to fly into the wind. If the wind direction is from the west, one runway is used for aircraft departing towards the west and the other is used for aircraft arriving from the east. If the wind direction is from the east, then the reverse applies.

Terminals

- 2.2.3 Heathrow operates four terminals, referred to as T2, T3, T4 and T5, where passengers arrive at and depart from the Airport. Terminal 1 is no longer in use. Specifically:
1. T2 and T3 form a cluster of terminal buildings known as the Central Terminal Area (CTA), which is situated in the central part of the Airport between the northern and southern runways. A landside road tunnel under the northern runway provides public access to the CTA
 2. T4 is located on the south-eastern part of the airfield to the east of the cargo terminal and south-east of southern runway
 3. T5 is situated between the northern and southern runways at the western end of the airfield.
- 2.2.4 Figure 2.2 shows the location of these terminals.

Taxiways

- 2.2.5 Heathrow has a taxiway network to circulate aircraft between the terminals and the runways under the guidance of air traffic control. This is shown on Figure 2.3.
- 2.2.6 The taxiway network comprises four parallel taxiways (two serving each of the runways), which are linked by cross field taxiways. There are also taxiways south of the southern runway connecting T4 and the cargo area to the rest of the Airport. Rapid Exit Taxiways (RETs) and Runway Access Taxiways (RATs) connect the taxiways to the runways and are used by aircraft entering and exiting the runways. More minor taxiway links connect all the taxiways to the aircraft stands.



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Aprons

- 2.2.7 Aprons are a designated space on an airfield for the parking of aircraft, refuelling, loading and unloading of passengers and freight. Each terminal building at Heathrow has its own apron. Additionally, there is a cargo apron to the south of the Airport for designated freight aircraft and a maintenance apron in the east of the Airport.
- 2.2.8 The aprons provide parking space for a wide range of passenger aircraft, from the smaller narrow body Airbus A320 or Boeing 737 up to large aircraft such as the Airbus A380 or Boeing 747.

Ancillary facilities

- 2.2.9 Ancillary facilities support the operation and maintenance of the Airport and are shown on Figure 2.4. They cover an area of around 228ha within the Airport boundary. These include:
1. Maintenance, repair and overhaul facilities: including aircraft washing facilities, stores and repair workshops and ground run pens to test engines. These are located in the east of the Airport in the area known as the Eastern Maintenance Base
 2. Cargo operations: general warehousing and cargo storage facilities within a HM customs controlled area. These include animal quarantine areas and Royal Mail facilities and are located in the south of the Airport with some facilities located just outside the boundary further south
 3. Other airport operational land: includes utilities, surface water pollution control and balancing ponds, construction compounds for ongoing work, in-flight catering facilities, air traffic control, baggage and parking for service equipment, fuelling facilities and some office-based facilities. These are located throughout the Airport.

Road access

- 2.2.10 The Airport is surrounded and accessed by an inner ring road, formed by the northern, eastern, southern and western perimeter roads and an outer ring of the A4, A312, A30 and A3044. These are shown on Figure 2.5. The terminal buildings are accessed via Junction 14a of the M25 (T5) or a spur road from the M4 (T2, T3). T4 is accessed from the A30.
- 2.2.11 The M4 spur road links to a northern tunnel that is the only means of land-side traffic access to the CTA.



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EIA Scoping Report – Chapter 2: Description of the existing site and its surroundings

- 2.2.12 Airside road tunnels provide operational links between T4 and the CTA and between T5 and the CTA. There is also a network of airside roads providing controlled access to the apron and aircraft manoeuvring areas.

Car parking and on-airport transport

- 2.2.13 As explained in paragraph 2.2.10, an inner ring road provides access around the Airport perimeter and connects to the local road network. There are car parking facilities serving each of the terminal buildings with other car parks located elsewhere around the Airport boundary. The Airport provides around 51,500 car park spaces for passengers, colleagues and tenants (spaces used by other airport businesses). All car parking facilities are shown on Figure 2.6.

Public and local transport

- 2.2.14 The Airport is accessible via the local road network with direct access to the M25 and M4 providing further access to the wider strategic road network.
- 2.2.15 A central bus station operating 24 hours a day is located in the CTA between T2 and T3. Separate bus services run to T4 and T5 and overall 31 bus and coach routes serve the Airport from a variety of local and national destinations.
- 2.2.16 The Airport is also accessible via the rail network, including the Heathrow Express (direct to T2, T3 and T5), Heathrow Connect (T2, T3 and T4) and the London Underground Piccadilly Line to all terminals. Passengers can also use a free internal rail transfer from the CTA to T4 and T5.
- 2.2.17 There are additional committed schemes which will increase the destinations served and capacity offered by rail between now and the opening of the new runway. The first such scheme will see the initial phase of Heathrow Crossrail services introduced. From December 2019, and the full opening of the Elizabeth line, rail services to Heathrow will increase from the current 18 trains per hour to at least 22 trains per hour.

Other airport related development

- 2.2.18 In addition to the core facilities at Heathrow, there are several other developments within the current Heathrow site boundary that support the operation of the Airport, such as hotels, offices and warehouses.
- 2.2.19 Some hotels are located adjacent to terminals but many are located a short bus ride away around the airport perimeter. Offices for airport colleagues are located in close proximity to the terminals, cargo and maintenance facilities.



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EIA Scoping Report – Chapter 2: Description of the existing site and its surroundings

Operations

- 2.2.20 Heathrow is one of the busiest two-runway airports in the world accommodating almost 480,000 ATMs per annum carrying over 76 million passengers and around 1.5 million tonnes of cargo. It operates 24 hours a day, seven days a week (although normal operating hours are different – see paragraphs 2.2.21 onwards). This equates to approximately 650 arrivals and 650 departures every day.
- 2.2.21 The runways are generally operated in segregated mode, where one runway is used for arriving aircraft and the other is used for departing aircraft. At some times of the day, for example, early in the morning when there is a build-up of airborne holding for arriving aircraft, tactical measures such as using both runways for landings can be applied to minimise delay.
- 2.2.22 The Cranford Agreement, established in 1952, prevented aircraft from taking off over the village of Cranford and also acted as an operational restriction. The Government committed to end the Cranford Agreement as a matter of policy in 2009, reaffirming this in 2010, and planning permission was granted for the infrastructure necessary for aircraft to take off using this route in February 2017. However, the taxiways of the northern runway were designed at a time when the Cranford Agreement was in force to respect its restrictions, and so do not currently allow departures to the east from the northern runway. The infrastructure and consequent introduction of easterly departures from the northern runway have yet to be implemented.
- 2.2.23 The Airport operates in either an ‘easterly’ or ‘westerly’ direction, as dictated by the wind conditions.
- 2.2.24 This means that during easterly operations, all aircraft movements (arrivals and departures) occur in an easterly direction and during westerly operations, all aircraft movements operate in a westerly direction. Westerly operations account for approximately 70% of all operations at Heathrow, dictated by prevailing wind conditions.
- 2.2.25 The Airport operates an alternation policy for its runways so that between the hours of 06:00 and 15:00 one runway is used for departing aircraft and the other for arriving aircraft. After 15:00 and until 23:00 with westerly operations, the orientation is swapped so that the runway that previously supported only departures then only supports arrivals and vice versa. As discussed in paragraph 2.2.22, in easterly operations, there is no runway alternation due to the legacy of the now rescinded Cranford Agreement.



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- 2.2.26 Although there is no ban on scheduled night flights, Heathrow does not schedule any departures or cargo operations between 23:00 and 06:00. The Airport also has a voluntary curfew in place that prevents flights from landing before 04:30.
- 2.2.27 As a Noise Designated Airport the Government is responsible for setting restrictions on night-time flying. These restrictions currently limit Heathrow to 5,800 night-time take-offs and landings a year (which constitutes just 1.2% of all Heathrow flights) between 23:30 and 06:00, with restrictions on the noise class of aircraft that can operate.
- 2.2.28 Around 80% of such night flights at the Airport are between 04:30 to 06:00, with on average around 16 aircraft scheduled to arrive each night between these hours. The remainder of night flights occur when aircraft scheduled to depart by 23:00 experience operational delay, the instances of which are reducing year on year.



Chapter 3

The DCO Project



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3. THE DCO PROJECT

3.1 Project design

- 3.1.1 As well as identifying a north-west runway at Heathrow as the preferred option for delivering additional capacity in the South-East, the revised draft Airports National Policy Statement (revised draft ANPS) establishes principles and parameters for certain aspects of the scale and nature of the scheme. For instance, paragraph 4.3 of the revised draft ANPS states that it:

“applies to schemes at Heathrow Airport (in the area shown within the illustrative scheme boundary map at Annex A) that include a runway of at least 3,500m in length and that are capable of delivering additional capacity of at least 260,000 air transport movements per annum, and associated infrastructure and surface access facilities.”

- 3.1.2 At the end of 2016, a Scheme Development Process commenced that will inform the selection of the scheme for which a Development Consent Order (DCO), promoted by the airport operator Heathrow Airport Limited, will be sought. As explained in the revised draft ANPS:

“While the Government has decided that a Northwest Runway at Heathrow Airport is its preferred scheme to deliver additional airport capacity (an illustrative masterplan is at Annex B of the Airports NPS), this does not limit variations resulting in the final scheme for which development consent is sought” (paragraph 4.11).

- 3.1.3 Key features of the principal components of the DCO Project – for example the broad location of the runway and the number and broad location of the terminals – are subject to relatively limited variation. The scope of the assessment is informed by the key features of the DCO Project components and the proposed approach to the assessment is applicable regardless of the final selected design options for each component.
- 3.1.4 The selection of components will be supported by the outcome of public consultation that Heathrow is undertaking prior to submission of the DCO application.
- 3.1.5 A long list of component option alternatives has been considered and is reported in the Scheme Development Report¹ which formed part of the suite of material consulted on as part of Consultation 1. However, options for each of the components still exist and these are described in this chapter. The feedback on options from Consultation 1 will inform the design process and this, including the

¹ Heathrow Airport Limited, Scheme Development Report Conclusion of Stage 2, January 2018



alternatives considered, will be reported in the Preliminary Environmental Information Report (PEIR) and consulted on in Consultation 2 for the DCO Project.

- 3.1.6 An overview of the process and methodology being followed for identifying and evaluating scheme options and selecting the scheme that will be the subject of the DCO application, is described in paragraph 3.1.7.
- 3.1.7 The four main stages of the process are summarised as follows:
1. **Stage 1** – Strategic Definition: the purpose of this stage is to set the objectives for the DCO Project and define the key inputs into the process. Examples of these inputs include: The Strategic Brief, which sets the strategic vision of an expanded airport and formed part of the background material for Consultation 1; the Evaluation Criteria Handbook, which outlines the criteria used for evaluating the evolving component and masterplan options. This stage has been completed
 2. **Stage 2** – Component Options Development: The components, some of which are key to defining the shape of the masterplan and the associated land take needed for the expansion, have gone through a design development process which involved: creating a longlist of all options to be considered; reducing the number of options under consideration; and evaluating the remaining options. The component options that were developed in this stage have been consulted upon in Consultation 1. The preferred options for each component will be taken forward to Stage 3. The analysis of feedback from consultees on the options presented during Consultation 1 is now underway. The component options are outlined in the description of the DCO Project in Section 3.3: Principal components of the DCO Project and were consulted on in Consultation 1
 3. **Stage 3** – Masterplan Options Development: In this stage, preferred options from the key components will be combined to create masterplan options. Feedback received during Consultation 1, together with the ongoing engagement with stakeholders, will be used to review, improve and endorse or change the preferred component options for inclusion in masterplan assembly. The resulting masterplan options will go through a similar process to that in the Component Options Development stage, in that the list of options will be reduced and the remaining options will be evaluated. The preferred masterplan will be formed from the options evaluated at the end of this stage
 4. **Stage 4** – Masterplan Finalisation: In this stage, the preferred masterplan formed in Stage 3 will be developed further, supported by further stakeholder engagement, ready to be consulted on at the second Consultation (Consultation 2) along with the alternatives which were considered and rejected. The preferred masterplan will be refined in the light of consultation feedback and on-going environmental assessment to refine and define



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appropriate mitigation for the effects of the masterplan on communities and the environment. This stage will conclude with the submission of the DCO application.

3.2 Overview of the DCO Project

- 3.2.1 Figure 3.1 illustrates all land being considered for the purposes of expanding the Airport, and provides a ‘plan sufficient to identify the land’ for the purposes of this Scoping Report. It should be noted, this represents the maximum extent based on all of the options for components that have been the subject of consultation in Consultation 1.
- 3.2.2 The areas shown on Figure 3.1 comprise:
1. Existing Heathrow planning boundary. Existing uses in this area will be subject to reconfiguration and intensification. Proposals will also include the provision of additional uses within this area
 2. Land being considered for the expanded airfield. This area includes the land required for the new runway, the supporting apron area and new taxiways
 3. Land being considered for infrastructure works (roads, rivers, water drainage and treatment); airport supporting facilities; airport related development; and construction sites.
- 3.2.3 Together with the description of the DCO Project components set out in this chapter, Figure 3.1 represents the full range of possible development options which could form part of the final DCO Project. This allows for consideration of the potential environmental effects of the full range of options under consideration, to ensure that the likely significant effects of each of the component options has been scoped into the assessment. **Chapter 4: Approach to EIA Scoping** provides further detail about the approach being taken to EIA scoping.
- 3.2.4 The DCO Project will be constructed in a number of phases, described in Section 3.4: Development programme and construction.
- 3.2.5 The new runway will require a section of the M25 motorway to the west of the Airport to be realigned and placed within a tunnel or below a bridge structure under the new runway. The continuing design work, informed by consultation and engagement, will determine the final configuration. The DCO Project will require the demolition of existing properties and displacement of certain land uses. The works will include the re-grading and remediation of land within the area where the new runway and other development is proposed. The existing northern and southern runways, along with much of the existing associated airport infrastructure, will be retained.



- 3.2.6 Proposals for landscaping, mitigation and compensation works ('green infrastructure') are being developed that will form a network of connected green spaces and water environments in the vicinity of the Airport.

DCO application

- 3.2.7 The DCO application will seek permission for the construction and operation of the Nationally Significant Infrastructure Projects (NSIPs) and associated and ancillary development, necessary to develop a third runway at Heathrow. Within those parameters, the DCO will seek permission for all of the physical infrastructure and operating capacity of Heathrow brought about by the third runway. It will also include all components which are necessary to achieve, operate, maintain and mitigate the effects of the proposals.
- 3.2.8 The principal components of the DCO Project (for example, the new runway, taxiways, M25 works etc.) will therefore be brought forward by Heathrow and consent will be sought for these through the DCO application. Design options for these components of the DCO Project are described in paragraphs 3.3.2 onwards along with a summary of the environmental topics that are relevant to that component.
- 3.2.9 The DCO application will also include provision for 'Associated Development'. This is defined by the Planning Act 2008 as 'development which is associated with the principal development subject to requirements' (i.e. associated with the NSIP(s), namely the new runway and the M25 works). Guidance provides that a 'direct relationship' between the Associated Development and the NSIP is necessary and that Associated Development must meet certain tests.
- 3.2.10 For some components of the DCO Project, such as airport supporting development, some displaced uses and airport related development, it is not yet clear the extent to which these uses will form part of the DCO Project, or whether some of these uses will be consented through the local planning process. The delivery of some aspects may be dependent upon market demand, and therefore consented by planning applications made by third parties.
- 3.2.11 For components the scope and scale of which is less clear, for example office floorspace, an assessment has been undertaken to determine the scale of demand that is expected to be generated by the delivery of a third runway, as set out in paragraphs 3.3.36 - 3.3.38 of this Scoping Report. Separately, a site search process has been undertaken in order to identify sites which could potentially accommodate development to meet this demand. If included in the DCO, these components would be accommodated within the area shown in purple on Figure 3.1.



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EIA Scoping Report – Chapter 3: The DCO Project

- 3.2.12 For the purposes of this Scoping Report, all elements described in Section 3.3: Principal components of the DCO Project have been treated as being part of the DCO Project to be consented by the DCO.
- 3.2.13 There may therefore be development which is not consented by the DCO, whether because such development is not Associated Development or another consenting route is preferred. Development that may be brought forward by others is likely to come forward through:
1. The local plan-making process: Heathrow is working with nearby local authorities through the Heathrow Strategic Planning Group (HSPG) to predict and plan for the growth which is likely to result from the Airport's expansion. The environmental effects of this growth will be assessed through the plan-making process via Strategic Environmental Assessment and Sustainability Appraisals, as well as via the planning application process for any specific proposals
 2. Independent planning applications: proposals brought forward by the market through the planning process (i.e. via planning applications) after the DCO application has been submitted will be required to consider environmental effects of the DCO Project, including taking account of any cumulative effects that could arise from their development in conjunction with Heathrow's proposals for expansion.
- 3.2.14 Where such development is reasonably foreseeable and not to be consented under the DCO, it will be taken into account either in relation to the baseline for the EIA for the DCO Project, or as "other development" in the EIA through the cumulative effects assessment (as appropriate).
- 3.2.15 It is proposed to seek an early release of capacity in the DCO application, to increase the current ATM cap by 25,000 ATMs per year, enabling the two existing runways to accommodate around 505,000 ATMs per year in advance of the new runway opening. This early release of capacity is referred to as 'early ATMs' throughout this Scoping Report.

3.3 Principal components of the DCO Project

- 3.3.1 This section presents the principal components that form part of the DCO Project, and the environmental topics that are relevant to each component.

Runways and taxiways

- 3.3.2 Figure 3.2 shows the broad location of the new runway. The new runway will be between 3,200m and 3,500m in length and is expected to be no wider than 60m with 7.5m shoulders and a graded area of 7.5m. It will be capable of



accommodating the largest commercial aircraft currently in service at Heathrow: the ICAO Code F family, for example the Airbus A380 family. As it crosses the M25, the runway will be on an embankment at a height of approximately three to five metres. At its western end near Colnbrook it will again be close to ground level. A minimum separation distance from the existing northern runway of at least 1,035m will be required to enable independent operation of the existing and proposed runways.

3.3.3 Taxiways will be required to serve the new runway and connect it with the existing Airport. These will include a western Around the End Taxiway (ATET) that avoids the need for aircraft to cross the northern and southern runways, new taxiways to the north and south of the existing northern runway and new taxiways to the west of existing T5.

Options

3.3.4 There are three options being considered. These are shown in Figure 3.3.

3.3.5 There are three broad areas being considered for new taxiways to link the new expansion facilities to the existing taxiway system. Taxiways may be needed in each of these areas to deliver the proposals.

Relevant environmental topics

3.3.6 Table 3.1 demonstrates the environmental topics that are relevant to the runway and taxiways.

Table 3.1 Environmental topics relevant to runway and taxiways

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Construction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓

Terminals and aprons

3.3.7 There is a need for new terminal or ‘satellite’ buildings to process passengers and new stands for aircraft parking and circulation (apron) space. The existing terminal capacity is proposed to be increased to handle approximately 130 mppa. Part of this increase in capacity will be met through physical extension and intensification of existing terminals and satellites, brought about through various infrastructure



and terminal improvements, but new buildings will be needed to provide the total capacity increase.

Options

3.3.8 Three options for future terminal capacity and apron space (shown in pink on Figure 3.4) are being considered for these components and it is possible that all three areas will need to be developed to support the expanded Airport.

Relevant environmental topics

3.3.7 Table 3.2 demonstrates the environmental topics that are relevant to the terminals and aprons.

Table 3.2 Environmental topics relevant to terminals and aprons

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Construction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓

M25 motorway

3.3.9 The expansion of the Airport will necessitate the re-alignment of the M25 motorway and will likely lead to associated modifications to Junctions 14 and 14a. The M25 currently runs in a north-south direction across the path of the proposed runway. It is proposed that the M25 would be realigned approximately 150 metres to the west of its current alignment and lowered by approximately 7m into a tunnel or bridge structure beneath the proposed runway. The realignment of the M25 is proposed to minimise the scale of earthworks required and to minimise the gradient required for the tunnel or bridge structure which avoids the need for significant changes to Junction 15. The proposed realignment would also allow for principally offline construction.

Options

3.3.10 Two options are being considered for the M25 realignment and are shown on Figure 3.5. Option AB1 and AB2 share similar alignments, however option AB2



includes collector-distributor roads² to run alongside the M25 to serve local traffic accessing nearby junctions.

3.3.11 Depending upon the layout of the Airport after expansion, either Junction 14 and 14a will be upgraded (Option JA2 in Figure 3.6) or alternatively only Junction 14 will be upgraded and Junction 14a will be closed (Option JC2 in Figure 3.6). Figure 3.6 also illustrates areas potentially affected by junction options under consideration.

Relevant environmental topics

3.3.12 Table 3.3 demonstrates the environmental topics that are relevant to the realignment of the M25.

Table 3.3 Environmental topics relevant to the realignment of the M25

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Construction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operation	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

Other road diversions

3.3.13 The provision of the new runway will impact directly on a range of other road infrastructure, including the A4 to the north of the existing Airport boundary and the A3044 to the west of the existing Airport boundary.

A4 options

3.3.14 As a result of the expansion of the Airport, the existing A4 will be severed between Colnbrook and the M4 Spur. It is therefore proposed to divert the A4 to maintain east-west connectivity.

3.3.15 Four options are being considered and are shown on Figure 3.7. Option 2E would use a new route north of the third runway between the A4 at Colnbrook and the A4 to the west of Sipson, bypassing Harmondsworth and Sipson. This option includes a section of tunnel running under the new runway, re-provides east-west

² Collector – distributor roads bring traffic from minor roads to the main carriageway of a major road.



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connectivity and creates an opportunity for new connectivity for residents and businesses.

- 3.3.16 Option 3A employs a route similar to 2E, but connects to the M4 Spur via a new junction with slip roads east of the A3044, to link into the A4. This option benefits from using existing infrastructure but would require the re-classification of the M4 Spur for use by local traffic.
- 3.3.17 Option 6C would follow a route south of the new runway, similar to the current A4 alignment. This route would connect the A4 east of Colnbrook to the A4 at Sipson and would pass through the expanded airfield in a cutting or tunnel. This option has good connectivity, but it would be more complex and costly to deliver.
- 3.3.18 A ‘do minimum’ option (option DM) is also being considered which would use the existing A4 road alignment to the west of the M25 and a short section of Holloway Lane. Whilst this option retains the existing road, it is not thought to be capable of providing sufficient capacity or connectivity. It has been retained as a potential option as it could provide local enhancements particularly in the early stages of delivery.

A3044 options

- 3.3.19 It is also likely that the A3044 will be diverted with associated junction works. The DCO Project would remove 7.2km of the 8.7km length of the A3044, severing it between the villages of Harmondsworth and Stanwell Moor. This would end connectivity between the A4 and A3113 routes, limit access for commercial and residential property to the western side of the Airport and limit access to Poyle and Colnbrook via Bath Road. The proposed diversion of the A3044 is designed to ensure the continuation of such connectivity. There are four short-listed options for the A3044 diversion which are shown in Figure 3.8.
- 3.3.20 Options 2A and 2Ai are north-south routes. 2A would run under the new runway and connect to a re-aligned A4 north of the new runway (Option 2e or 3a) whereas 2Ai would connect to a re-aligned A4 (Option 6c) which would be in a cutting or tunnel under the expanded airfield.
- 3.3.21 Option 3D would be a short, direct route east of Poyle and north of Colnbrook, avoiding the village centres.
- 3.3.22 Option 3G would be a route south of Poyle and Colnbrook, through a gap between Colnbrook and Brands Hill.

Stanwell Moor junction options

- 3.3.23 Stanwell Moor Junction is located to the south-west side of the Airport connecting the A3044, A3113 Airport Way (which provides direct access to M25 J14) and the



Southern Perimeter Road. As a result of the DCO Project, the A3044 to the north will be severed, as well as the A3113 to the east. There are likely to be significant changes to the distribution of the traffic around the Airport that will mean that the Stanwell Moor Junction will be more heavily trafficked. To address this and minimise traffic congestion impacts, the Junction is proposed to be replaced. There are four options for this which are shown in Figure 3.9.

- 3.3.24 Options SMJ 2 and SMJ 3 follow the alignment of the existing roads, delivering additional capacity whilst minimising property loss and encroachment of the road on existing communities. Options SMJ 1 and SMJ 5 are more extensive realignments and consequently have higher encroachment into surrounding areas.

Other road network changes

- 3.3.25 Other changes are also proposed to the road network around the Airport as follows:
1. Loss of the Northern Perimeter Road to the west of the Emirates roundabout (where Tunnel Road enters the airport from the north). Due to space constraints, it is not anticipated that this road will be replaced so its functions will need to be transferred to other routes in the future road network, most likely the chosen options for the A4 and the A3044
 2. Upgrades to the Southern Perimeter Road to improve connectivity associated with the Airport's expansion. Options include increasing the road to three lanes both ways, providing an alternative access to the Cargo Area and/or introducing demand management measures, such as road user charging
 3. Loss of the Western Perimeter Road. As with the Northern Perimeter Road, it is not anticipated that the Western Perimeter Road will be replaced, therefore its functions will be transferred to other routes in the future road network, most likely the chosen options for the A4 and the A3044
 4. Options for enhancing access to T5 are being evaluated in the event of the loss of J14A – including the need to enhance the capacity of the Stanwell Moor Junction as described in paragraph 3.3.23.
 5. The existing northern tunnel, located at the southern end of the M4 Spur with additional arms to access the A4 and Northern Perimeter Road, is the only public road link into the CTA. It is critical to the operation of the airport. This tunnel will not be affected by the proposals, although it could be enhanced with the provision of pedestrian access. However, a second access to the CTA from the south of the airport may be required for resilience, capacity and connectivity. Figure 3.10 shows two options for the second tunnel. Option S5 would make use of an existing cargo tunnel whilst option S6 would require a new tunnel from the Southern Perimeter Road into the CTA.



Relevant environmental topics

3.3.26 Table 3.4 demonstrates the environmental topics that are relevant to the road diversions.

Table 3.4 Relevant environmental topics to road diversions

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Construction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operation	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

Public transport

3.3.27 It is proposed that the current central bus station will be upgraded into a new public transport interchange. This will provide more capacity for buses, be better integrated with T2 and provide easier access to London Underground and Rail stations. The T5 rail station will be upgraded to allow access to any new terminal facilities, allowing for additional trains, higher passenger flows and a better passenger experience.

3.3.28 A significantly increased coach and bus service will use this upgraded infrastructure, serving more destinations both nationally and locally as set out in the airport surface access strategy³.

Relevant environmental topics

3.3.29 Table 3.5 demonstrates the environmental topics that are relevant to the upgraded bus station.

³ Heathrow Airport Limited, Our approach to developing a surface access strategy, January 2018



Table 3.5 Relevant environmental topics to upgraded bus station

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Construction	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Operation	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓

Rivers and flood storage

3.3.30 The expansion of Heathrow will extend the Airport's footprint into the Colne Valley, impinging on the existing alignments of watercourses and areas of floodplain storage within the valley. It is proposed to divert the flow of the River Colne, the Colne Brook, the River Wraysbury, the Longford River and the Duke of Northumberland's River. All four proposed realignment options would result in the River Colne, the River Wraysbury, the Longford River and the Duke of Northumberland's River being routed through a covered river corridor under the runway, with the Rivers Colne and Wraysbury to the west and the Longford River and Duke of Northumberland's River to the east. The covered corridor will be designed to allow animal and fish passage. All of the rivers are proposed to be separated and returned to their current channels and flow conditions downstream of the expanded airfield.

Options

- 3.3.31 Potential alignments of rivers under consideration are shown Figure 3.11 and include:
1. Option C1a maintains all rivers as close to their existing alignments as possible
 2. Option C1c is similar to C1a, but the Colne Brook is diverted around the western end of the new runway
 3. Option C1d includes an additional diversion channel around the western perimeter of the airfield, diverting a proportion of low flows from the River Colne and River Wraysbury, via the Colne Brook. This loss of flow from the Colne/Wraysbury system is balanced by a reduction in the flow through the Poyle Channel, which connects the River Wraysbury and the Colne Brook
 4. Option C1e is similar to option C1c, with the addition of more extensive new channels to the west around Colnbrook village. A new channel, conveying some low flows from the River Colne and River Wraysbury, would be created to the west of the Colne Brook, flowing to the west of Colnbrook Village and



then returning flow to the Colne Brook to the west of Poyle. As in C1d flows are balanced through a reduction in flows through the Poyle Channel.

3.3.32 The new runway would be built partly in the flood plain of the Colne Valley rivers, and preliminary modelling indicates that the volume of compensatory storage the DCO Project will need to provide for the Colne Brook is of the order of 290,000m³, with storage of the order of 140,000m³ required for the Rivers Colne and Wraysbury. A range of sites have been identified which could be used for flood storage to the north of the Airport, as shown on Figure 3.12.

Relevant environmental topics

3.3.33 Table 3.6 demonstrates the environmental topics that are relevant to the rivers and flood storage options.

Table 3.6 Environmental topics relevant to rivers and flood storage

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
Construction	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Operation		✓	✓	✓	✓		✓		✓	✓	✓	✓		✓

Airport supporting facilities

3.3.34 Airport supporting facilities are essential to the safe and efficient operation of an airport. To support the expansion of the core components of the DCO Project, it will be necessary to grow Heathrow Airport’s facilities. Cargo, maintenance and other operational areas currently account for approximately 223ha of land within or directly adjacent to the Airport. At this time, it is estimated that up to approximately 95ha of land outside of the current Airport boundary could additionally be required to accommodate these uses for the DCO Project. The potential sites are shown in Figure 3.13.

- 3.3.35 The proposed DCO Project airport supporting facilities include the following:
1. Delivery of new cargo floorspace. Potentially up to 95ha of gross area for cargo facilities on airport, with changes to existing facilities and other warehousing operations in order to double the cargo processing capacity of the Airport
 2. Delivery of new aircraft Maintenance, Repair and Overhaul (MRO) floorspace. Expansion will require growth in MRO facilities including hangars and engine ground run pen facilities, and potentially a forward maintenance unit outside



the existing base. Any options for growth will principally be focussed on efficiencies and reconfiguration of the existing MRO area, together with the potential for some remote facilities closer to the aprons and should not require any other additional land

3. A second air traffic control tower similar to the existing 87m high tower will be safeguarded for on the new northern apron. (An alternative approach using digital tower technology, is being investigated, which if proven, will not require this second conventional tower)
4. Delivery of new aviation fuel storage facilities. The new storage facilities will increase Heathrow's existing fuel network supply capacity from a maximum of circa 27 million litres per day to circa 34 million litres per day
5. Upgraded and new waste water treatment and network infrastructure. There are currently three options to provide additional wastewater treatment capacity required for the expanded Airport: upgrade the existing treatment facilities at Mogden waste water treatment works (WWTW) in West London; upgrade existing treatment facilities local to the Airport and divert some or all of the flows from Heathrow to these facilities; or construct a new WWTW local to the Airport to treat some or all of the flows from the expanded Airport and surrounding communities. For the third option, two locations are being considered for a potential new WWTW as shown in Figure 3.14
6. Diversion, relocation, protection and/or expansion of the public utilities network. This network includes overhead power lines, sewers, sludge mains, raw water tunnels, potable water distribution network pipelines, fibre optic telecommunications, gas and fuel pipelines. Many of the existing services are concentrated in the land to the west of the Airport, either side of the M25 corridor, along the existing A4 Bath Road and along the southern boundary of the Airport and will require diverting because of the Airport expansion proposals
7. New generation plant to support the energy demand of the Airport
8. Upgraded and new waste and recycling centres. This is expected to include a resource recovery centre to promote re-use and recycling of airport wastes, areas to receive sweepings from runway, apron and highway cleaning and enhanced management of aircraft cabin waste
9. Consolidation of car parking. At present, there are 51,500 on-airport car parking spaces at Heathrow, 39,000 of which are directly controlled by Heathrow. It is proposed to keep the number of spaces at a similar level with expansion, but to consolidate parking into fewer locations, both on-airport



(adjacent to terminals) and at ‘parkway’ locations adjacent to the expanded Airport as shown in Figures 3.15.

3.3.36 Table 3.7 demonstrates the environmental topics that are relevant to the airport supporting facilities.

Table 3.7 Relevant environmental topics to airport supporting facilities

	Air quality	Biodiversity	Carbon and GHG	Climate change	Community	Economics and employment	Historic environment	Health	Landscape and visual amenity	Land quality	Major accidents and disasters	Noise and vibration	Traffic and transport	Water
New cargo floorspace	✓	✓			✓	✓	✓	✓	✓	✓	✓			✓
MRO floorspace		✓					✓	✓	✓	✓	✓			✓
Air traffic control tower		✓					✓		✓	✓	✓			✓
Aviation fuel storage facilities		✓					✓		✓	✓	✓			✓
Wastewater treatment network		✓					✓	✓	✓	✓	✓			✓
Public utilities network		✓					✓	✓	✓	✓	✓			✓
Energy generation plant		✓	✓	✓			✓	✓	✓	✓	✓	✓		✓
Waste and recycling facilities		✓					✓	✓	✓	✓	✓			✓
Car parking		✓			✓	✓	✓	✓	✓	✓	✓		✓	✓

Displaced uses

3.3.37 Certain commercial uses, infrastructure and major facilities that are expected to be displaced by the DCO Project are indicated in Figure 3.16. The replacement of some of these uses may be delivered through the DCO application, through the local planning process (whether by Heathrow or by third parties) or be left to the market to respond to the demand created by the loss of these facilities. The exact strategy for each is currently being determined. Alternative locations may be sought close to Heathrow, or further afield, depending on each facility’s existing and future requirements and its relationship with the Airport. The likely displaced uses include:



1. Immigration Removal Centres (IRCs). Harmondsworth and Colnbrook IRCs are Home Office facilities located on adjacent sites consisting of approximately 5.1ha, north of the A4 Colnbrook Bypass and east of the Duke of Northumberland's River. Given the important function the IRCs play, a single replacement site would need to be identified near the airport. The replacement facility will need to provide equivalent amenities and capacity to the existing facilities
2. Lakeside Waste Management Facilities. The Lakeside Waste Management Facilities are currently located in Lakeside Industrial Estate, Colnbrook. The Energy from Waste (EfW) facility is located to the south-west of the M25/M4 junction, in the path of the proposed runway and taxiways. The EfW facility incinerates approximately 450,000 tonnes of non-recyclable waste per annum, processing household, commercial and industrial waste. The incineration process generates electricity for the national grid. Heathrow is working closely with the operator of the Lakeside plant to consider how the facility could be relocated. A site selection exercise has commenced to search for potentially suitable locations in the surrounding area which could accommodate facilities providing the same waste management capacity. Once a preferred site has been identified and the planning and business case agreed, a standalone planning application could proceed in advance of the DCO application. A key part of facilitating this will be early dialogue with the appropriate Local Planning Authority and consultation with local people on the proposals
3. British Airways' Waterside Office. The Waterside office complex is located north of the A4 Colnbrook Bypass and east of Harmondsworth Moor. The campus of approximately 14ha comprises IAG's and British Airways (BA) UK headquarters (IAG is the parent company of BA) in a four-storey building providing approximately 60,000m² of office floor space and other uses, including the BA operations control centre. A Community Learning Centre, managed by BA, and associated car parking is located in the north-western part of the site. The site is located in the path of the proposed new runway. Work has begun on a site selection process to establish a preferred location for a replacement facility.
4. BT Data Centre and Maintenance Depot. The BT Data Centre and Maintenance Depot are located north of the A4 and the IRCs, east of the Duke of Northumberland's River and within the area which would be impacted by the new runway, therefore requiring the removal of these facilities. The BT Data Centre does not need to be located close to the Airport in order to operate. A potential alternative site away from the Airport has already been identified and studies are ongoing to understand if this location is feasible



5. **Total Fuel Depot.** The existing Total Fuel Depot site of approximately 1.5ha is located within Poyle Industrial Estate, west of the M25. The depot receives aviation fuel by train and distributes it to the airport via an underground pipeline. The rail line that serves the facility is likely to be severed by the new runway so a replacement rail terminal would need to be provided. The replacement rail terminal would be relocated to a site served by a rail line in close proximity to the existing Northern Fuel Receipt Facility (NFRF) at the airport. A new underground pipeline would then be constructed to connect the Rail Terminal to the NFRF. A number of sites have been considered for the potential relocation of the facility, but they have yet to be evaluated as part of the Scheme Development Process. Due to the specific requirements of the rail terminal, the number of available relocation options are limited to a zone around the rail line. There are two sites that may be suitable options: Thorney Mill Road site (to the north of the M4 and east of the M25); and north of the operational boundary of the airport and south-west of the M25/M4 junction (between the M4 and the Colnbrook-By-pass)
6. **SSE substation and pylons.** The SSE Substation is located on the Poyle Industrial Estate close to the M25. The substation is fed by a series of pylons running north/south for 1.4km to the west of the M25. The most southerly pylon is positioned at the substation itself and the most northerly pylon is located close to the junction of the M25/M4. It is currently proposed that this relocation is achieved through the normal planning processes in advance of the DCO application to allow a timely start to the M25 works. An alternative position for the substation will need to be identified to suit the location of the new power line route and to maintain connection to the local area it currently serves
7. **Total Rail Head.** A re-provided rail head will be located on the Colnbrook branch of the Great Western Main Line (GWML). The optimum location for the rail head is immediately north of the new runway where it crosses the M25 into the Colne Valley – close to the existing rail logistics facilities. The re-provided rail head will provide the principal import and export facility for earth and landfill, aggregates such as sand and cement and containerised goods for construction purposes, reducing the number of vehicles on national and local roads. The capacity of the rail head is dictated by the number of train paths available to move trains from the rail head on to the GWML. Further work with Network Rail is required to establish capacity, but it is likely that the railhead will operate 24 hours a day to utilise available paths during the night when passenger services are much reduced.

Relevant environmental topics

- 3.3.38 With the exception of the Immigration Removal Centres, which are expected to form part of the DCO Project in the revised draft ANPS, the assessment will only



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consider the removal of these facilities (so, for example, consider the effects of their demolition) as part of the DCO Project and not their replacement. The replacement of these facilities would then be considered as part of the wider scheme and within the cumulative effects assessment as far as this is possible. They would then be assessed in line with the methodology described in **Chapter 4: Approach to EIA scoping**.

Airport related development

3.3.39 'Airport related development' is a term which is used to describe a range of development that is related to the Airport's operation, such as hotels, offices, and warehousing. In some cases, this is provided within the operational boundary where there is a particularly strong functional link with the Airport operation (for example terminal-linked hotels and supply chain offices), but often it is located outside but close to the Airport. Table 3.8 shows the broad categories of development which closely relate to activity at the Airport.

Table 3.8 Airport related development

Hotels	Industry and warehousing	Offices
Terminal linked hotels Bus linked hotels More distant hotels	Cargo handling Freight forwarding Airline catering Maintenance (additional to MRO) Other warehousing and logistics Light and heavy industrial	Airport supply chain offices Small scale offices Large scale international corporate office



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3.3.40 Heathrow, with input from HSPG, has undertaken analysis of potential future demand and this is summarised in Table 3.9.

Table 3.9 Potential future demand (in sqm, unless otherwise specified)

	Current provision (sqm or No. hotel rooms)	Of which is likely to be displaced (sqm or No. hotel rooms)	New demand (sqm or No. hotel rooms)	2040 (current + new demand) (sqm or No. hotel rooms)
Airline catering	c.65,000	c.16,000	c. 51,000	c.116,000
Maintenance	c.102,000	c.1,000	c.27,000	c.129,000
Cargo handling	c.512,000	c.18,000	c.534,000	c.1,046,000
Freight forwarding	c. 389,000	c.6,000	c.106,000	c.495,000
Light industry	c.25,000	c.0	c.25,000	c.50,000
Heavy industry	c.24,000	c.0	c.24,000	c.48,000
Other airport related warehousing and logistics	c. 441,000	c. 68,000	c.445,000	c. 886,000
Office supporting airport supply chain	c.109,000	c.46,000	c.63,000	c.172,000
Small scale local office demand	c.54,000	c.7,000	c.31,000	c.85,000
Large scale international corporate office demand	c.276,000	c.2,000	c.218,000	c. 494,000
Total	c.1,997,000	c. 164,000	c.1,524,000	c.3,521,000
Hotel rooms	c. 10,800	c. 2,355 – 2,960	c. 6,300	c. 18,700

3.3.41 The consenting mechanism for the full quantum of airport related development has not yet been determined. As with the replacement of displaced uses, it could come forward through Heathrow's DCO application, through the local planning process and/or left to the market to respond to the uplift in demand.



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3.4 Development programme and construction

3.4.1 The expansion of the Airport is a large, complex construction project which will require the temporary⁴ use of land beyond the proposed permanent land use, to support construction and related logistics operations.

Construction phases and timeline

3.4.2 The detailed phasing and approach for construction are currently being developed and will be the subject of further consultation, with the aim being to:

1. Reduce effects on local communities and the environment
2. Maximise opportunities to deliver capacity quickly and efficiently
3. Spread the benefit of the DCO Project as widely as possible.

3.4.3 The indicative period for the construction of the new runway and any components required to enable the runway to operate is currently 2021 to 2026, with the runway expected to be open by a target date of 2026. However, construction of the terminals and associated infrastructure will continue beyond 2026, phased in line with demand, and is expected to be fully developed by 2035.

3.4.4 The DCO Project is expected to be developed in phases, which can be described as follows:

1. Creating the space for expansion
2. Airfield expansion
3. Campus development.

3.4.5 Indicative timeframes are provided in relation to each of these phases below.

Creating the space for expansion - enabling works (approximately 2021 – 2024)

3.4.6 The first phase would start shortly after the DCO is granted and relevant pre-commencement DCO requirements have been discharged. In this phase, activities would focus on site preparation works, and providing the necessary logistics infrastructure for the proposed construction activities. It is currently anticipated that this would include the following key activities:

1. Site establishment works including logistics facilities
2. Advance mitigation works and site clearance

⁴ This land will be required for the duration of the construction and logistics operations.



3. Remove and construct replacement facilities for displaced uses which require early re-provision
4. Removal of existing structures
5. Commencement of diversion/realignment of existing rivers
6. Commencement of diversion of existing utilities
7. Provision of new, diversionary and replacement roads.

Airfield expansion (approximately 2024 – 2026)

- 3.4.7 The second phase, 'airfield expansion', would include the earthworks required for the creation of the new formation level (the level at which excavation completes and construction starts) on the airfield and the construction of the new runway and taxiways. Most earthworks activities would take place in the first three years of construction. Construction of the runway would follow the completion of the formation level. Activities would be phased so that runway construction in one zone could commence while earthworks are ongoing in another zone.
- 3.4.8 To reduce the need to import fill material, the proposed approach would be to maximise the excavation of existing mineral resources. Possible locations for nearby borrow pits that have the potential to supply the required fill have been identified. Potential mineral resources within the airfield are also being identified. Strategies to minimise material stockpiling are being developed, but where this is not possible, potential site areas where material can be stockpiled until it is placed in its final location are being considered. Figure 3.17 shows possible sites for borrow pits, mineral resources and stockpiling. The construction of the new runway, taxiways and other civil works and systems (such as the laying of utilities) would be phased to suit the completion of the earthworks in each zone and to include any ground settlement period required.
- 3.4.9 It is currently anticipated that activities that would be carried out during this phase would include:
1. Drainage installation
 2. Foundations construction
 3. Construction of concrete pavements
 4. Construction of subsurface tunnels
 5. Creation of services (electrical and lighting)
 6. Construction of associated airfield facilities
 7. Testing and commissioning of the runway and taxiways.



- 3.4.10 It is anticipated that construction of the runway and taxiways would take between two and three years to complete.

Campus development (approximately 2023 – expected to be fully developed by 2035)

- 3.4.11 The third phase, 'campus development', would include the construction of the new terminals and satellites. Terminal construction would start once the final site(s) for new terminals and satellites are available and ready for construction (in some cases, this may involve the displacement and/or relocation of existing uses) and, therefore, would run concurrently with the second phase for a period.
- 3.4.12 Terminal capacity construction may be phased over a period of up to 15 years in line with demand. This is in part to overcome development constraints on some of the proposed site locations for terminal and satellite buildings (namely to the west of T5).
- 3.4.13 Construction activities would increase during the creation of the campus and would peak when both the new runway and terminals are under construction. During this period, it is estimated that a peak construction workforce of between 10,000 and 15,000 would be required. The workforce would reduce following the completion of the new runway and would then be largely localised in the terminals and built facilities.
- 3.4.14 To reduce the number of activities happening on site at the same time, supporting facilities will be used such as:
1. Using rail freight to import bulk materials, reducing the vehicle movements and effects on local roads
 2. Using pre-booked delivery slots to allow the time of each delivery to be controlled
 3. Providing bus services to transport the construction workforce to and from parking zones, areas of accommodation and linking to the public transport network
 4. Using on, near and off-site logistic hubs. There are likely to be four sites used across the UK, either existing operational facilities or sites that will be developed to meet the logistics requirements.
- 3.4.15 Sites identified which could be temporarily used for construction are shown in Figure 3.17.
- 3.4.16 The facilities that will be located on each site have not yet been determined, but would include:



1. Contractor compounds. These are areas allocated to the management of people and resources, including contractors' dedicated office space, plant and maintenance and repair operations (for the construction operation), and a storage or laydown area for construction materials
2. Control posts and site entrances. These are areas where security checks for materials and workforce entering and leaving construction sites are carried out. They will be located in easy-to-access areas for both workers and construction vehicles
3. A re-provided rail head. This will provide the principal means to manage the arrival of bulk material to the construction zone. Much of this material will be transported from logistics hubs located across the UK. The use of rail over road to transport a wide variety of inputs to the construction programme is better for the environment and reduces the number of vehicles on national and local roads. The rail head is expected to be a modified line located on the Colnbrook branch of the Great Western Main Line
4. Lorry parks and call forward points. These are areas allocated to manage the flow of HGVs arriving and departing the construction zone, and are typically managed by access and control posts and a Delivery Management System to regulate arrivals and departures across the construction zone
5. Consolidation zones. These are areas where several loads of material are consolidated into a single vehicle movement, reducing the number of vehicle movements required. Additional security checks can take place in these zones on the consolidated loads. These loads are then driven to the destination construction site. These consolidation zones are expected to be used less at the front end of the construction period, and more during the building period
6. Batching plants for concrete and asphalt. These will produce and store construction materials in situ (avoiding unnecessary transport movements into and out of the construction zone). This is to support construction of buildings and infrastructure as well as local roads and motorway works
7. Pre-cast concrete plants. These will provide the ability to manufacture high-volume pre-cast products within the construction zone. The manufacture of large, bespoke pre-cast structural elements of the new infrastructure on site will reduce the need to transport these along public roads from elsewhere in the country
8. Prefabrication facilities. These will provide the manufacture of a variety of elements, from structural to fit-out components, within the construction zone. Fabrication of these in a controlled, enclosed environment local to the



- construction sites will ensure against unnecessary transport movements on the local roads
9. Structural steelwork preassembly facilities. These will provide space on-site to bring together steelwork components for construction
 10. Temporary car parking. This is to be used by the construction workforce in addition to public transport
 11. Temporary construction workers' accommodation. Work is on-going to determine whether this is required and a number of options are being explored
 12. Borrow pits. These will be used to supply mineral resources for the required fill material on site. Following excavation, the pits may be reinstated as lakes, or restored, subject to environmental permitting, using excavated waste from the landfill sites that cannot be left in-situ within the Airport boundary
 13. Stockpile sites. These will be used to temporarily store material in advance of it being placed in its final location. The use of such sites may be necessary during the early phases when the earth becomes available earlier than it is required in the programme.

Operation of airport

- 3.4.17 The DCO Project will involve increasing operating capacity from the current 480,000 ATMs per year limit to at least 740,000 ATMs per year and from 76 mppa to approximately 130 mppa per year. The exact growth trajectory is still to be determined and will be in line with demand.
- 3.4.18 As described in paragraph 3.2.15 of this Scoping Report, it is proposed to seek consent through the DCO application to increase the current ATM cap by 25,000 ATMs per year, enabling the two existing runways to accommodate around 505,000 ATMs per year in advance of the new runway opening ('early ATMs'). Initial analysis suggests that up to 25,000 ATMs per year could be accommodated on the two existing runways by implementing new procedures and efficiency improvements, whilst maintaining current resilience levels. If consented, early phasing of additional ATMs could take place soon after the DCO is granted.
- 3.4.19 A number of the key operating principles have already been developed and the subject of consultation. These broadly comprise:
 1. Consideration of the new flight paths and how best to provide respite for local communities. For the most part changes to airspace, including the establishment of new flight paths, will occur through the ACP



2. Implementing a night time ban on scheduled flights for a six-and-a-half-hour period between 23:00 and 07:00 with the exact timing of the ban being subject to consultation
 3. Operating a runway alternation scheme for the three-runway Airport. This involves using one runway at any one time solely for take-off, another for landing and the final in 'mixed' mode i.e. for both take-off and landing. These modes of operation will then be alternated after a period which is to be determined. This gives a range of options for providing local communities with respite from aircraft overhead
 4. The creation of a noise envelope which provides a framework for the sustainable management and control of the effects of noise that balances growth and noise reduction and provides certainty about how noise will be addressed in the long term.
- 3.4.20 The operating model for the Airport will be developed as the design is progressed and after feedback is received from Consultation 1.

Decommissioning

- 3.4.21 Once completed, the expansion of the Airport will be a permanent feature. Closure and decommissioning of the facility is not therefore considered as part of the DCO Project.

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Chapter 4

Approach to EIA scoping



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4. APPROACH TO EIA SCOPING

- 4.1.1 Paragraph 5 of Schedule 4 of the EIA Regulations states that the Environmental Impact Assessment (EIA) must identify, describe and assess, the direct and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, positive and negative significant effects of the DCO Project upon specific environmental factors.
- 4.1.2 In addition, Planning Inspectorate (PINS) Advice Note Seven¹ summarises the requirements of the EIA Regulations in relation to scoping and provides additional guidance on timing of scoping, the treatment of options and includes a further list of information that a Scoping Report should provide. Table 4.1 sets out the requirements of the EIA Regulations and Table 4.2 includes guidance provided by Advice Note Seven. Both tables then describe where in this Scoping Report the requirements or guidance have been addressed.

Table 4.1 Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 requirements for scoping

Requirement	Location in this Scoping Report
Regulation 10 (3) of the EIA Regulations (requests for scoping)	
A plan sufficient to identify the land	Figure 3.1
A description of the Proposed Development, including its location and technical capacity	Chapter 3: The DCO Project
An explanation of the likely significant effects of the development on the environment	Contained in individual topic chapters 5 to 18.
Such other information or representations as the person making the request may wish to provide or make	Chapter 2: Description of the existing site and its surroundings Chapter 3: The DCO Project

Table 4.2 PINS Advice Note Seven requirements

Requirement	Location in this Scoping Report
An explanation of the approach to addressing uncertainty where it remains in relation to elements of the DCO Project for example design parameters	Section 4.4: Spatial and temporal scope

¹ Planning Inspectorate, Advice Note Seven: EIA: Process, Preliminary Environmental Information and Environmental Statements. Version 6, December 2017



Requirement	Location in this Scoping Report
Referenced plans presented at an appropriate scale to convey clearly the information and all known features associated with the Proposed Development	Figures 3.2 to 3.17
An outline of the reasonable alternatives considered and the reasons for selecting the preferred option	Section 3.1: Project design, describes the options appraisal process
A summary table depicting each of the aspects and matters that are requested to be scoped out allowing for quick identification of issues	Section 4.5: Summary of scope of the assessment
A detailed description of the aspects and measures proposed to be scoped out of future assessment with justification provided	Table 4.3
Results of baseline studies where available and where relevant to the decision to scope in or out aspects or matters	Topic chapters 5 to 18 and associated appendices summarise any relevant background baseline reports.
Aspects and matters to be scoped in, the report should include details of the methods to be used to assess impacts and to determine significance of effect for example criteria for determining sensitivity and magnitude	Section 4.2: Approach to identifying likely significant effects. Topic chapters 5 to 18 then describe topic specific approaches to determining effects, which effects are scoped in and any scoped out effects.
Any avoidance or mitigation measures proposed, how they may be secured and the anticipated residual effects	Where it is possible to determine the effect at this stage of the DCO Project, this is covered in the topic chapters 5 to 18

4.2 Approach to identifying likely significant effects

4.2.1 The approach taken to the preparation of this Scoping Report has been informed by PINS Advice Note Seven. It also reflects that the EIA Regulations require an Environmental Statement (ES) to focus on the aspects of the environment likely to be subject to significant environmental effects. In this context, the Department for Communities and Local Government's (DCLG's) EIA Planning Practice Guidance², says:

“Whilst every Environmental Statement should provide a full factual description of the development, the emphasis of Schedule 4 is on the “main” or “significant” environmental effects to which a development is likely to give rise. The Environmental Statement should be proportionate and not be any longer than is necessary to assess properly those effects. Where, for example, only one environmental factor is likely to be significantly affected, the

² Department for Communities and Local Government, Planning Practice Guidance, March 2014



assessment should focus on that issue only. Impacts which have little or no significance for the particular development in question will need only very brief treatment to indicate that their possible relevance has been considered”.

- 4.2.2 The scoping in and out of proposed effects in this Scoping Report is based on currently available information with respect to the DCO Project description, baseline conditions and using information about:
1. The receptors that could be affected by the DCO Project (including people as well as environmental receptors such as the air, land, or the water environment)
 2. The activities expected to be involved in constructing and operating the DCO Project
 3. Changes that could result from these activities (such as changes in traffic flows or land cover as a result of the DCO Project)
 4. The expected magnitude and other characteristics of these environmental changes and the susceptibility of relevant receptors to exposure to these changes (such as how biodiversity receptors might be affected by changes in land cover)
 5. The extent to which the design of the DCO Project avoids, reduces, enhances or improves any likely effects.
- 4.2.3 Drawing upon this information, the assessment of whether an effect has the potential to be of likely significance has been based upon professional judgement and where relevant, recommended topic specific methodologies and established practice. In applying this judgement, use has been made of a simple test that to be significant an effect must be of sufficient importance that it should be taken into consideration when making a development control decision³.
- 4.2.4 If the information that is available at the Scoping Report stage does not enable a robust conclusion to be reached that a potentially significant effect is not likely to be significant, the effect is then scoped into the assessment. All other effects (i.e. that are not specifically identified in the Scoping Report) are not likely to be significant. Where relevant, this is described in each case in the topic chapters.
- 4.2.5 Given the phase in the DCO Project’s development, this scoping exercise is being undertaken on component design options and it is from these alternatives that the DCO Project will be refined. This being the case, it is acknowledged that at this stage in the process it may not be possible to scope out likely significant effects. However, this scoping exercise requests engagement on the approach to setting the study area, assessment methodologies and baseline data that will form the

³ European Commission, Guidance on EIA: Scoping, June 2001



basis of the EIA. The proposed approach to the assessments is appropriate in order to assess the likely significant effects of each component, and will apply to the design option selected in each case.

- 4.2.6 The areas shown in Figure 3.1 represent all the areas covered by the options under consideration for each of the components set out in Section 3.1: Project design. Not all of this land will therefore be developed or form part of the final DCO Project. For each component which is assumed for the purposes of scoping to be part of the DCO Project (as explained above in Section 3.2: Overview of the DCO Project and Section 3.3: Principal components), the topic chapters consider the environmental effects of the full range of options, to ensure that the likely significant effects of each of the component options have been scoped into the assessment, meaning the scoping exercise will remain applicable and robust after the options have been further refined.

Significance criteria

- 4.2.7 For those effects identified as potentially significant and included in the scope of the assessment, significance criteria will be applied to determine the likely significance of each effect.
- 4.2.8 The level of significance of an effect is commonly derived from combining measures evaluating the magnitude of impact and the value and sensitivity of the resource(s) and/or receptor(s) affected.
- 4.2.9 Magnitude of impact is defined as the overall level of change in the environment and includes matters such as the extent over which that impact occurs, duration, likelihood, frequency and reversibility. For the purposes of the DCO Project, magnitude is categorised as either high, medium, low or negligible, unless stated otherwise. Topic chapters provide further detail on what represents a high, medium, low or negligible impact for individual topics, drawing on topic specific guidelines as appropriate.
- 4.2.10 The value or sensitivity of a receptor is generally defined as a function of a number of factors such as rarity, fragility, replaceability and importance of the resource, and is generally determined in a geographical context. The sensitivity is also a function of the capacity of the resource/receptor to accommodate changes or recover. For the purposes of this assessment, value or sensitivity is categorised as either high, medium or low, unless stated otherwise. Topic chapters provide further detail on what represents a high, medium or low value/sensitivity for individual topics, drawing on topic-specific guidelines as appropriate.
- 4.2.11 In order to provide a consistent approach to expressing the outcomes of each of the topic assessments undertaken, a series of generic significance criteria descriptors have been developed in the form of a significance matrix as shown in



Table 4.3 and Table 4.4. Effects can be positive or negative. For each effect, this combines the impact magnitude with the value and sensitivity of the resource/receptor affected by the impact(s) to determine the level of significance. Where necessary, the evaluation of effects has also been informed by expert professional judgement to reach a balanced conclusion on the ultimate significance of each effect. This is particularly the case for certain topics where there may not be clear boundaries between the sensitivity or magnitude of effect, meaning that topic specific guidance and professional judgement is needed to provide clarity on the resulting level of effect.

4.2.12 For the purposes of the EIA for the DCO Project, ‘major’ effects will always be deemed to be significant (marked red in Table 4.3), with ‘moderate’ effects usually significant, but in some topic specific circumstances, may be deemed not significant. All other levels of effect are deemed non-significant (marked green in Table 4.3).

Table 4.3 Generic significance matrix

Receptor value/sensitivity			
	High	Medium	Low
High	Major	Major	Moderate
Medium	Major	Moderate	Minor
Low	Moderate	Minor	Negligible
Negligible	Minor	Negligible	Negligible

Table 4.4 Generic descriptions of significance ratings

Level of significance	Description
Major	Very large or large change in environmental or socio-economic conditions. Effects, both negative and positive, which are likely to be important considerations at a national to regional level because they contribute to achieving national/regional objectives, or, which are likely to result in exceedance of statutory objectives and/or breaches of legislation.
Moderate	Intermediate change in environmental or socio-economic conditions. Effects that are likely to be important considerations at a regional or local level.
Minor	Small change in environmental or socio-economic conditions. These effects may be raised as local issues but are unlikely to be of importance in the decision-making process.
Negligible	No discernible change in environmental or socio-economic conditions. An effect that is likely to have a neutral or negligible influence.



- 4.2.13 Topics use the above generic significance criteria unless otherwise specified in the topic chapter, for example, if there are topic-specific guidelines that specify significance criteria to be used which are based on topic-specific guidelines, which are different to those shown in Table 4.4.

Environmental mitigation

- 4.2.14 The Institute of Environmental Management and Assessment (IEMA) provides guidance⁴ on three broad categories of mitigation measures:
1. Primary (inherent): Modifications to the location or design of the development made during the pre-application phase that are an inherent part of the DCO Project, and do not require additional action to be taken
 2. Secondary (foreseeable): Actions that will require further activity in order to achieve the anticipated outcome. These may be imposed as part of the planning consent, or through inclusion in the ES
 3. Tertiary (inexorable): Actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects.
- 4.2.15 Primary mitigation is described as ‘embedded measures’ in the context of the Scoping Report and Preliminary Environmental Information Report (PEIR) and ES that will follow. Embedded mitigation relates to opportunities to avoid or reduce significant effects through design that are taken where possible. Subsequent environmental assessment will also be completed taking these measures into account as part of the DCO Project. A good example is a new greenspace created to accommodate protected species.
- 4.2.16 Secondary mitigation is described as ‘additional mitigation’ in the context of this Scoping Report and the PEIR and ES that will follow. It is mitigation not related to the design but imposed only to reduce a defined environmental effect. A good example is the provision of a noise insulation scheme to reduce the effects of noise in people’s homes.
- 4.2.17 Tertiary mitigation is described as ‘best practice’ in the context of this Scoping Report and the PEIR and ES that will follow, and relates to measures such as recognised means of dust control on construction sites, controlled within an overall Code of Construction Practice (CoCP).

⁴ Institute of Environmental Management and Assessment, Delivering Quality Development, July 2016



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- 4.2.18 Each of the topic chapters 5-18 includes a section entitled ‘Approach to mitigation’. These sections outline any topic specific avoidance and mitigation measures that have been considered so far and how they are expected to be secured (for example, through a CoCP).
- 4.2.19 The approach to embedded measures also means that significant effects in the ES will not be presented as an unmitigated and then mitigated scheme as primary mitigation and tertiary mitigation form part of the DCO Project itself and will be considered in the assessment. Likely significant effects arising from the DCO Project (with primary and tertiary mitigation assumed to be in place) will be presented initially. Further (secondary) mitigation that may be required to address any significant adverse effects remaining will be identified and residual effects assessed with such additional mitigation in place as a second stage.

4.3 Spatial and temporal scope

Spatial scope

- 4.3.1 The geographic location and context within which the Airport sits is described in **Chapter 2: Description of the existing site and its surroundings**.
- 4.3.2 The spatial scope for each topic assessment will depend on the nature of the potential effects and the location of receptors that could be affected. These study areas are described within each of the topic chapters. The spatial scope of the technical assessments will therefore take account of:
1. Physical area of the DCO Project
 2. Nature of the baseline environment
 3. Manner and extent to which environmental effects may occur.
- 4.3.3 The topic chapters describe how the study area will be set for the assessment of likely significant environmental effects associated with that topic. The methodology for setting the precise study area will then be applied to the final location of the components and supporting infrastructure as presented in the preferred scheme in the PEIR and the final scheme set out in the ES.
- 4.3.4 Where relevant, the topic chapters also describe where, as the design of the proposals evolve, these study areas may need to be refined to ensure they still adequately reflect the area of potential influence for likely significant environmental effects.



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Temporal scope and assessment years

- 4.3.5 The DCO Project would be constructed and implemented over a number of years and as such, several assessment years will need to be considered in the topic assessments. These are proposed to be:
1. Current baseline – the current baseline year will differ between topics being dependent on the year(s) in which baseline data were collected/modelled. Data needs also to be considered ‘current’ i.e. not so old as to be ‘out of date’
 2. Future baseline – multiple future baseline scenarios (years) will be defined for both construction and operational assessment. This is because the environmental effects associated particularly with operations may change over time, because, for example, aircraft/road vehicles will become quieter or less ‘polluting’. In addition, future baseline year(s) will not be defined as simply a ‘do nothing’ scenario. This is because the Airport would, even without proposals for expansion, still develop to satisfy the needs of airlines, passengers, Civil Aviation Authority etc. Much of this would be expected to be undertaken under the Airport’s Permitted Development rights with the rest being through other consenting regimes (such as through town and country planning legislation). Therefore a two runway (2R) Masterplan will be produced that sets out how the Airport would be expected to evolve in the absence of expansion, and this will form the basis of the future baseline. The topic chapters will use appropriate population and employment forecasts or projections in defining their future baselines in accordance with topic-specific guidance and standard practice
 3. Release of first phase of capacity – the year in which the number of ATMs first increase (the ‘early ATMs’), which may be prior to the third runway being operational
 4. Year of predicted maximum environmental effects during the construction phase – potentially the year(s) of highest construction vehicle movements, highest number of workforce or highest noise/dust pollution levels, albeit may differ between technical topics as, for example, the year of highest noise levels may not coincide with year of highest NO_x emissions. Note that operation of the third runway is expected to commence before all construction activities are complete and therefore an assessment of effects from both the combined operational and construction activities will also be undertaken
 5. Year of opening – the year that the first ATMs use the third runway
 6. Year of predicted maximum environmental effects during the operational phase – potentially the year(s) of highest ATMs, passengers, or emissions from road vehicles are the highest, albeit may differ between environmental topics as, for example, year of highest noise levels may not coincide with year of highest NO_x emissions. Note that operation of the third runway is expected to



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commence before all construction activities are complete and therefore an assessment of effects from both the combined operational and construction activities will also be undertaken

7. Year of maximum ATM capacity – the year in which the maximum forecasted number of ATMs utilise the Airport.

4.3.6 There is expected to be a need to demonstrate the effectiveness / maturity of proposed mitigation, particularly landscape and ecological mitigation.

4.3.7 Within each topic chapter additional assessment years to those described above may also be identified, if required.

4.4 Waste and resources

4.4.1 It is proposed that waste will not be the subject of a separate topic chapter in the EIA, as the effects of any waste related development will be addressed as part of the appropriate environmental topics and associated strategies, as set out in Table 4.5.



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Table 4.5 Approach to assessment of impacts from wastes arising from construction and operation of the DCO Project

Issue	Key considerations raised by the revised draft ANPS	Approach to assessment
<p>Identifying appropriate measures for sustainable resource and waste management</p>	<p><i>'The applicant should set out the arrangements that are proposed for managing any waste produced in the application for development consent. The arrangements described should include information on the proposed waste recovery and disposal system for all waste generated by the development. The applicant should seek to minimise the volume of waste sent for disposal unless it can be demonstrated that the alternative is the best overall environmental, social and economic outcome when considered over the whole lifetime of the project.'</i> [revised draft ANPS paragraph 5.139]</p> <p><i>'The targets for preparation for re-use and recycling of municipal waste (50%), and for construction and demolition waste (70%) set out by the Waste Framework Directive (2008/98/EC) should be considered 'minimum acceptable practice' for the construction and operation of any new airport infrastructure.'</i> [revised draft ANPS paragraph 5.135]</p> <p><i>'The applicant should set out a comprehensive suite of mitigations to eliminate or significantly reduce the risk of adverse impacts associated with resource and waste management'</i> [revised draft ANPS paragraph 5.141]</p>	<p>A Resources Management Plan will detail resource management in the construction and operations phases, covering waste, energy and water. Potential mitigation measures to address any potential adverse impacts associated with resources and waste management will be outlined in the Resources Management Plan.</p> <p>Heathrow will employ best practice techniques to manage the additional waste arisings associated with the construction and operation of the expanded airport. Circular economy principles will be incorporated (aligning with the principles of EU Action Plan for the Circular Economy⁵), where practicable, to prevent waste generation and extracting the maximum value from assets, products and materials whilst in use, then recovering/regenerating products and materials at the end of each service life.</p>

⁵ European Commission, Communication from the commission to the European parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Closing the loop - An EU action plan for the Circular Economy, December 2015



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Issue	Key considerations raised by the revised draft ANPS	Approach to assessment
	<p><i>'The Secretary of State should be satisfied that the process set out provides assurance that;</i></p> <ul style="list-style-type: none"> - <i>Waste produced will be properly managed, both onsite and offsite....</i> - <i>Adequate steps have been taken to minimise the volume of waste arising, and of the volume of waste arising sent to disposal, except where an alternative is the most sustainable outcome overall' [revised draft ANPS paragraph 5.143]</i> <p><i>'Where necessary, the Secretary of State will require the applicant to develop a resource management plan to ensure that appropriate measures for sustainable resource and waste management are secured' [revised draft ANPS paragraph 5.144]</i></p>	
<p>Environmental effects from construction, demolition and excavation wastes arising from the DCO Project</p>		<p>Mitigation and enhancement for waste and resources management during construction will be set out in an overall CoCP, the Resource Management Plan, and further detailed in the site waste management plan(s) produced by works contractors. Effects associated with construction, demolition and excavation wastes arising from the DCO Project will be outlined in the Resources Management Plan.</p>
<p>Capacity of existing waste management facilities</p>	<p><i>'The Secretary of State should be satisfied that the process set out provides assurance that:</i></p>	<p>As part of the scheme development, mitigation to avoid or reduce the likely effects from the export of waste arisings off-site is being developed.</p>

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Issue	Key considerations raised by the revised draft ANPS	Approach to assessment
	<p><i>...- The waste from the proposed development can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arising should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arising in the area....'</i> [revised draft ANPS paragraph 5.143]</p>	<p>The draft approach to assessing the effects of the DCO Project on existing waste management facilities is set out in Appendix 4.1: Waste Impact Assessment Methodology, with separate methodologies proposed for the construction and operations phases respectively.</p> <p>Data on future arisings from Airport operations will be based on historic data, factored up for the increase in annual passengers. The amount of waste associated with airport related development will be based on metrics from national and regional commercial and industrial waste surveys, factored up in proportion to the amount of new demand predicted to arise from the expanded Airport. Data on construction waste arisings will be estimated using industry metrics.</p>
Environmental impacts of existing waste management facilities		<p>Assessment is not proposed to be undertaken of the environmental effects associated with existing receptor waste facilities, as any licensed waste facilities that might accept waste as a result of the DCO Project have already been subject to assessment by the Environment Agency as part of the environmental permitting process.</p>
Environmental impacts of new waste management facilities		<p>No new waste treatment facilities are proposed as part of the DCO Project.</p> <p>However, environmental effects from any such facilities, if required, would be considered as part of the relevant EIA topic chapters, in particular;</p> <p>1. Chapter 5: Air quality and odour</p>



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Issue	Key considerations raised by the revised draft ANPS	Approach to assessment
		<p>2. Chapter 12: Health</p> <p>3. Chapter 16: Noise and vibration</p>
Transport impacts from the management of wastes		<p>Assessed in Chapter 17: Traffic and transport</p> <p>It is proposed to utilise road and rail transport for construction waste which require off-site management</p>
Carbon and other greenhouse gas (GHG) emissions from the management of wastes		<p>Assessed in Chapter 7: Carbon and other greenhouse gases</p> <p>GHG emissions will arise from the transportation (vehicle fuel combustion) and management (landfilled, re-used, recycled etc.) of waste generated from airport activities.</p>
Environmental impacts resulting from waste generated due to interaction during the construction phase with landfill sites, fly-tipped waste and contaminated land		<p>Assessed in Chapter 14: Land quality</p>
Management of foul sewer, surface water runoff and discharge from dewatering operations during construction		<p>Assessed in Chapter 18: Water environment</p>



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Issue	Key considerations raised by the revised draft ANPS	Approach to assessment
Safeguarding and the extraction of mineral resources	<p><i>'The applicant should safeguard any mineral resources on the proposed site for the preferred scheme as far as possible.'</i> [revised draft ANPS paragraph 5.115]</p> <p><i>'Where the preferred scheme has an impact on a mineral safeguarding area, the Secretary of State must ensure that the applicant has put forward appropriate mitigation measures to safeguard the mineral resources'</i> [revised draft ANPS paragraph 5.119]</p>	Assessed in Chapter 14: Land quality and Chapter 10: Economics and employment
Relocation of Lakeside energy from waste plant	<p><i>'The effects of removing the Lakeside energy from waste plant upon capacity for treatment of waste will require assessment'</i> [revised draft ANPS paragraph 5.140]</p> <p><i>'The Government recognises the role of the Lakeside Energy from Waste plant in local waste management plans. The applicant should make reasonable endeavours to ensure that sufficient provision is made to address the reduction in waste treatment capacity caused by the loss of the Lakeside Energy from Waste plant'</i> [revised draft ANPS paragraph 5.142]</p>	See Displaced Uses section within Chapter 3: The DCO Project of this Scoping Report.



4.5 Summary scope of the assessment

- 4.5.1 The scope of the assessment described in Chapters 5 to 18 is shown in Table 4.6.



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Table 4.6 Summary scope of the assessment

Environmental topic	Scope of assessment
Air quality	<p>Construction</p> <ol style="list-style-type: none"> 1. Emission of dust causing loss of amenity at sensitive receptors that occur near to work sites and haul road 2. Emission of odours causing loss of amenity at sensitive receptors that occur near to work sites 3. Emissions from construction vehicles and plant through fuel combustion that could increase concentrations of pollutants that could affect human health (NO₂ and particulate matter (PM)) <p>Operation</p> <ol style="list-style-type: none"> 1. Increased emission from aircraft through fuel combustion that could increase concentrations of pollutants that could affect human health (NO₂ and PM) 2. Increased emissions of odour from aircraft fuel, aircraft operation and airfield activity causing loss of amenity at sensitive receptors 3. Increased emissions from vehicles on public highways that could increase concentrations of pollutants that could affect human health (NO₂ and PM) at receptors near to road
Biodiversity	<p>Construction</p> <ol style="list-style-type: none"> 1. Degradation and/or loss of habitat (including through soil compaction) 2. Reduction in the availability of foraging and commuting habitat and resting or breeding sites 3. Killing or injury of fauna through the removal of occupied resting or breeding sites 4. Loss of ecological connectivity through severance of habitats resulting in fragmentation 5. Introduction or spread of invasive species 6. Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites 7. Disruption of the physiology of species reliant on natural day/night and seasonal light level changes resulting in loss of fitness and reduction in survival rates 8. Loss of ecological connectivity through severance (due to introduction of light) of habitats resulting in fragmentation 9. Disturbance and displacement of species susceptible to noise/visual disturbance resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates

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Environmental topic	Scope of assessment
	<ol style="list-style-type: none"> 10. Changes to local hydrology resulting in changes or loss of surrounding habitats with subsequent effects on the fauna they support 11. Loss or damage of sensitive flora through smothering resulting in effects on habitat composition and the fauna that it supports 12. Deposition of dust resulting in enrichment of sensitive HPis, including those contained within statutory designated sites, leading to alteration of flora through changes in baseline conditions and the species which they support 13. Direct effects on invertebrates through ingestion or direct deposition on sedentary species 14. Freshwater habitat degradation and/or loss and/or reduction of geomorphological and flow diversity 15. Loss of ecological connectivity through severance of habitats resulting in fragmentation 16. A change in flow quantity and seasonal flow patterns particularly high flood events, may alter fish mitigation patterns for species reliant on these cues for upstream migration. 17. Increased flow may also result in increased mortality of semi-aquatic species. 18. Killing or injury of fauna through the removal of occupied resting or breeding sites 19. Potential for reduction in sediment transport leading to alteration of downstream habitats and river habitat deposition features 20. Introduction or spread of invasive species through the spread or introduction of contaminated spoil 21. Potential decrease in water quality parameters such as dissolved oxygen and biochemical oxygen and/or flows at discharge/abstraction point resulting in changes to freshwater vegetation communities and the fauna these support 22. Creation of flood storage areas offers opportunities for the creation of new wetland habitat areas 23. Sensitive species may actively avoid sources of light disturbance and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates 24. Behavioural avoidance of species from areas with high level of noise and/or vibration. Sensitive species may actively avoid these stimuli and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats and/or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates 25. Alteration to hydrology including surface water connections resulting in areas becoming wetter or drier, leading to changes to vegetation communities and the species these support

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Environmental topic	Scope of assessment
	<p>26. The introduction of toxic pollutants or sediments into the environment resulting in changes, loss or damage to terrestrial or freshwater environments and the fauna they support</p> <p>27. Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive HPis, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support</p> <p>28. Potential killing or injury of fauna through road traffic collisions</p> <p>29. Fauna sensitive to human presence may actively avoid sources of human disturbance and search for alternative habitats leading to a reduction in the distribution of these species within suitable habitats and /or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.</p> <p>Operation</p> <ol style="list-style-type: none"> 1. Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive terrestrial HPis, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support 2. The accumulation of nitrogen levels in water may result in the build-up of algal blooms and subsequent changes in vegetation community. 3. Behavioural avoidance of species from areas with high level of noise and/or vibration. Sensitive species may actively avoid these stimuli and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats and/or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates 4. Death or injury of individual birds (bird strike) 5. Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites. 6. Disruption of the physiology of species reliant on natural day/night and seasonal light level changes resulting in loss of fitness and reduction in survival rates. 7. Loss of ecological connectivity through severance (due to introduction of light) of habitats resulting in fragmentation 8. The introduction of toxic pollutants or sediments into the environment resulting in changes, loss or damage to terrestrial or freshwater environments and the fauna they support 9. Potential killing or injury of fauna through road traffic collisions

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Environmental topic	Scope of assessment
Carbon and other greenhouse gases	<p>10. Positive increase in biodiversity value through creation and management of suitable habitats.</p> <p>Construction</p> <ol style="list-style-type: none"> 1. The manufacturing of construction materials (including concrete and steel etc.). This includes the extraction / mining resources and any primary and secondary processing or manufacturing. As there will be many new assets and changes to existing assets, there will be corresponding indirect Green House Gas (GHG) emissions 2. Vehicles used for the delivery of construction materials to site and removal of construction waste. This includes construction staff travel as well. This will likely use vehicles with internal combustion engines and therefore also lead to GHG emissions 3. The operation of on-site plant equipment during construction and demolition of assets. Construction plant will be required to undertake the demolition and construction works, including excavators, cranes and other equipment. There will also be the need for temporary accommodation, lighting and power. These activities will consume energy and/or water and consequently lead to GHG emission. <p>Operation</p> <ol style="list-style-type: none"> 1. Emissions associated with flights occur due to the use of aircraft fuel. Fuel use differs between aircraft types and throughout the different phases of a flight (landing, take-off and cruise). Due to the increased number of flights and changes in aircraft technology, as well as operational practices, the level of GHG emissions associated with flights is expected to change 2. Airport staff, passengers and freight movements will increase as a result of the DCO Project. GHG emissions associated with surface access will depend on the number of transport movements and the mixture of transport modes (road versus rail access) used over time. For example, electric trains are more efficient in terms of GHG emissions than diesel or petrol-powered vehicles 3. The increased capacity of the airport will lead to a range of new buildings, hangars, fuelling stations, depots and other facilities being developed. There will be an increase in airside vehicle operations. These changes will lead to changes in electricity use, fuel use and water consumption. Waste will also be generated through the airports day-to-day activities. GHG emissions will arise from the transportation (vehicle fuel combustion) and management (landfilled, re-used, recycled etc.) of waste generated from airport activities.



Environmental topic	Scope of assessment
<p>Climate change</p>	<p>Construction and Operation (In-combination climate change effects) The assessment will consider likely in-combination climate change effects for all environmental topics associated with the DCO Project. Below are detailed some examples of likely significant climate change effects to be considered (this is not an exhaustive list):</p> <p>Construction</p> <ol style="list-style-type: none"> 1. Extreme weather events or climatic events (strong winds, heatwaves, droughts, intense rainfall events) exacerbating health and safety impacts. <p>Operation</p> <ol style="list-style-type: none"> 1. Change in seasonal patterns of rainfall and temperature resulting in changes in soil moisture levels, length of growing season and irrigation requirements for newly planted trees and green infrastructure 2. Change in seasonal patterns of rainfall and temperature resulting in changes in quality and quantity of habitats 3. Change in seasonal patterns of rainfall and temperature resulting in changes in high and low flows in water bodies. <p>Construction and Operation (Climate change resilience effects) The assessment of climate change resilience effects will consider the impact of climate change on all the elements of the DCO Project (as described in Chapter 3: The DCO Project), and in addition any critical assets or infrastructure connections upon which Heathrow is dependent for successful operation (outside of the DCO Project itself). Some of the likely CCR effects for assets and infrastructure are described below (this is not an exhaustive list):</p> <p>Construction</p> <ol style="list-style-type: none"> 1. Extreme weather events or climatic events (for example strong winds) resulting in effects on the resilience of construction equipment and resulting in delays to construction programme (for example strong winds resulting in crane topple) 2. Extreme weather events or climatic events (for example heavy rainfall) resulting in effects on the viability of and access to construction sites (for example. heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of construction site).



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Environmental topic	Scope of assessment
	<p>Operation</p> <ol style="list-style-type: none"> 1. High temperatures and heatwave events resulting in effects on aircraft operations (for example maximum take-off weight and scheduling) 2. High temperatures and heatwave events resulting in effects on overheating of terminals and buildings 3. Extreme weather events or climatic events (strong winds, heatwaves, droughts, intense rainfall events) resulting in effects on resilience of surface access connecting infrastructure (for example. local roads and junctions or train routes and stations).
<p>Community</p>	<p>Construction and operation</p> <ol style="list-style-type: none"> 1. Potential effects related to the displacement of tenants and owners of residential property across all tenures as a result of the extent of land required by the DCO Project (both temporary and permanent land take), including transitional effects 2. Potential temporary and permanent effects on the viability, sustainability, accessibility and users of all existing and planned physical community facilities and public spaces and community-facing businesses within the inner study area where they are displaced by the land needed for the DCO Project 3. Potential temporary and permanent effects on the viability (functionality) or sustainability of existing recreational spaces and routes and the subsequent effect on users 4. Potential temporary and permanent effects on the viability, sustainability, accessibility of all physical community facilities and community-facing businesses within the inner study area where they are subject to changes in catchment or amenity (as identified through the in-combination environmental effects in Section 4.7: In-combination effects) on their viability 5. Potential temporary and permanent effects on community cohesion and the nature of communities as a result of change in population characteristics and distribution of homes and physical facilities 6. Potential temporary/permanent/ transitional effects on the provision of public services including regulatory and planning services (where relevant) across the wider study area 7. Potential permanent effects related to changes in the characteristics of communities around the Airport as a result of loss and displacement of homes, and uptake of the Wider Property Offer which could result in a different tenure and demographic profile, and changes to demand for community facilities.



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Environmental topic	Scope of assessment
	<p>8. (Operation only) Potential permanent effects on the viability, sustainability, and accessibility of all physical community facilities and community-facing businesses within the inner study area where they are subject to changes in amenity (as identified through other environmental assessments or within the in-combination environmental effects).</p>
<p>Economics and employment</p>	<p>Construction</p> <ol style="list-style-type: none"> 1. Potential temporary or permanent displacement of businesses or commercial activity including property, land and minerals 2. Potential effects on sustainability or viability of businesses (including agricultural businesses) resulting from the DCO Project (such as temporary or permanent loss of catchment population, change in environment, or severance as a result of changes to access) 3. Disruption to residents and their economic activity, through environmental changes and changes in access (for example severance and journey time) to/from employment locations 4. Potential effects on the local and wider economy as a result of significant residual environmental effects (from other topic assessments) which have the potential for economic consequences 5. Potential temporary effect of employment generation and effects on businesses in the construction supply chain 6. Potential effects of new employment and business generated by the DCO Project on the labour market, skills and training (for example. apprenticeships) in or related to the construction phase 7. Potential temporary effect of employment generation and construction activity on the labour market and subsequently the housing market <p>Operation</p> <ol style="list-style-type: none"> 1. Potential wider effects on employment and the economy through direct influence (for example jobs and businesses supported directly related to the operation of the Airport), indirect influence (growth in business and jobs supported in the Airport's supply chain) and induced influence (jobs and businesses supported as a result of expenditure on goods and services) of expansion 2. Potential effects of new employment and business generated by the DCO Project on skills and training (for example apprenticeships) in or related to the operational development 3. Potential additional effects on employment and the economy through catalytic effects at the regional scale (as a result of improved connectivity resulting in additional trade, foreign direct investment and tourism)



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Environmental topic	Scope of assessment
	<ol style="list-style-type: none"> 4. Potential for wider economic effects such as inward investment ,local retention of business rates, spending and supply chain effects as a result of policy changes and changes to the local economy and business community as a direct result of the DCO Project 5. Potential additional effects on the wider labour market and housing market as a result of operational employment generation 6. Potential effects on the local and wider economy as a result of significant residual environmental effects (as identified through other environmental assessments) which have the potential for economic consequences (including transport/traffic effects).
Health	Construction <ol style="list-style-type: none"> 1. Living conditions: Relocation and change in living conditions for those being relocated 2. Social cohesion: Change in number of people living in the community (i.e. those not subject to residential relocation) and accessing community services causing a disruption to existing social networks and feelings and perceptions of their community 3. Access to services: Change in ability of local people to access services, including health and social care, educational and recreational amenities and any effect on the viability of these resources 4. Lifestyle: Change in opportunities for access to formal and informal open space affecting active lifestyles 5. Lifestyle: Change in local traffic and transport (including community severance) could influence the use of active travel modes (cycling and walking) and therefore affect active lifestyles 6. Environment: Use of construction plant and construction traffic may generate noise, emissions to air (including dust and odour) and changes to visual amenity (including light pollution) which may affect health and wellbeing 7. Economy: Changes in employment as a result of generation of a construction workforce and small loss of existing jobs due to impacts on a small number of commercial properties 8. Economy: Changes in local economic conditions due to the presence of a construction workforce and procurement of local goods and services 9. Social cohesion: Presence of a construction workforce can be a source of concern for the local community.



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Environmental topic	Scope of assessment
	<p>Operation</p> <ol style="list-style-type: none"> 1. Economy: Changes in employment as a result of generation of an operational workforce (including an estimated 40,000 new jobs available to people in the local area as well as indirect impacts affecting changes in income and economic development) 2. Environment: Changes in sound exposure as a result of additional ATMs (and other noise and vibration sources), a different aircraft fleet mix and different operating regimes. Noise (unwanted sound) is a pathway for health effects relating to annoyance; sleep disturbance; cardiovascular impacts and cognitive development of children 3. Environment: Changes to emissions to air from aircraft, airside plant and vehicles, combustion plant (for example energy centre) and road traffic vehicles (oxides of nitrogen, nitrogen dioxide and particulate matter) have the potential to cause health effects, principally affecting respiratory and cardiovascular health 4. Safety: Changes in the road layout and road traffic may result in a change in road traffic incidents (effects associated with road safety) 5. Access to services: Change in the number of people accessing and demanding healthcare services (additional passengers and Airport workers) 6. Lifestyle: Changes in the opportunity to access leisure travel and the impacts on lifestyle benefits for passengers 7. Social cohesion: Changes in how local people feel about their community, sense of place and wellbeing.
<p>Historic environment</p>	<p>Construction</p> <ol style="list-style-type: none"> 1. Direct loss of significance of heritage assets as a result of material change to or complete loss of heritage assets. These effects may be permanent as a result of certain construction activities 2. Change to the significance of heritage assets as a result of perceptual change to the setting of heritage assets. These indirect effects may be temporary for the duration of certain construction activities. <p>Operation</p> <ol style="list-style-type: none"> 1. Change to the significance of heritage assets as a result of material or perceptual change to heritage assets. These effects may be permanent as a result of the DCO Project. 2. Change to the significance of heritage assets as a result of perceptual change to heritage assets. These effects would persist through the operation of the DCO Project and would be treated as permanent.

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Environmental topic	Scope of assessment
	3. Change to the significance of heritage assets as a result of perceptual change to heritage assets. These effects would persist through the operation of the proposed development and while they could be intermittent would be treated as permanent.
Landscape and visual amenity	Construction <ol style="list-style-type: none"> Construction activities have the potential to adversely affect landscape/townscape character together with visual amenity. Operation <ol style="list-style-type: none"> Infrastructure and development proposals have the potential to adversely affect landscape/townscape character together with visual amenity.
Land quality	Construction <ol style="list-style-type: none"> Mobilisation of contamination via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in contamination of controlled waters Mobilisation of contamination via numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health impacts Build-up of gases in confined spaces in existing or newly constructed infrastructure on and beyond the land being considered for the DCO Project Exposure to contamination via direct contact, inhalation and/or ingestion of soils and dusts resulting in health impacts Damage to newly constructed infrastructure from aggressive ground conditions (such as sulphate attack on concrete) and geohazards including unstable ground conditions Creation of new sources of contamination which have the potential to result in contamination of controlled waters and risks to human health during construction Contaminant migration via the potential to introduce preferential pathways which would otherwise not be present resulting in contamination of controlled waters Accidental spillages and leaks resulting in ground contamination Permanent loss of Best and Most Versatile (BMV) agricultural land Permanent loss of topsoil Changes to soil structure due to inappropriate storage and/or handling of soils or due to the use of heavy machinery which causes compaction



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Environmental topic	Scope of assessment
	<ol style="list-style-type: none"> 12. Soil erosion due to inappropriate storage and/or construction activities 13. Permanent loss of Sipson Lane Complex Regionally Important Geological Site (RIGS) 14. Temporary loss of, or damage to BMV agricultural land 15. Temporary loss of topsoil 16. Temporary loss of, or damage to, Sipson Lane Complex RIGS 17. Permanently prevent viable exploitation of a resource (through sterilisation or adjacent development) that is of a high significance, regionally or nationally 18. Significant loss of a resource (through extraction as part of the DCO Project) that cannot be accommodated by alternative sites at a local or regional level 19. Viability of the operation of an ongoing mineral extraction site is clearly and demonstrably reduced 20. Permanent sterilisation of a significant proportion of a mineral deposit (excluding those under ongoing extraction), but which are unlikely to be regionally or nationally significant in terms of overall mineral availability and supply 21. Temporary sterilisation of a significant proportion of a mineral deposit (excluding those under ongoing extraction), but which would be expected to be reversed in the short to medium term 22. Temporary reversal of previous sterilisation allowing access to unworked minerals for a limited period prior to the new development being constructed. <p>Operation</p> <ol style="list-style-type: none"> 1. Generation of landfill leachate, which, if not properly managed, could accumulate and/or migrate to controlled waters 2. Damage to infrastructure from aggressive ground conditions and geohazards including unstable ground conditions and settlement 3. Build-up of landfill gases in confined spaces in existing or newly constructed infrastructure on and beyond the development boundary 4. Accidental spillages and leaks resulting in ground contamination.
<p>Major accidents and disasters</p>	<p>Construction</p> <ol style="list-style-type: none"> 1. Risk of an accident or natural disaster leading to: <ol style="list-style-type: none"> a. Fatalities, injuries and ill health to people, including construction workers, within the study area, property damage b. Serious, widespread and prolonged damage to the environment e.g. release of environmentally damaging substance.



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Environmental topic	Scope of assessment
	<p>Operation</p> <ol style="list-style-type: none"> 1. Risk of an accident or natural disaster leading to: <ol style="list-style-type: none"> a. Fatalities, injuries and ill health to people, including construction workers, within the study area, property damage b. Serious, widespread and prolonged damage to the environment e.g. release of environmentally damaging substance.
<p>Noise and vibrations</p>	<p>Construction</p> <ol style="list-style-type: none"> 1. Effects caused by airborne noise, or vibration from construction activities such as tunnelling, demolition, earthworks, borrow pits, runway, bridges, road realignments, utility works and airport buildings 2. Effects caused by temporary changes to road and rail on the existing networks 3. Project-wide combined effects, as well as cumulative effects with other developments 4. Residential receptors health outcomes assessed will include annoyance and sleep disturbance 5. For sensitive non-residential receptors health outcomes assessed will include annoyance and disruption of function (for example cognitive impairment in schools) <p>Operation</p> <ol style="list-style-type: none"> 1. Effects caused by the operational airport including air traffic movements, ground noise from aircraft, airfield operations, maintenance, repair and overhaul of aircraft, surface access proposals and associated developments such as airport hotels 2. Effects caused by short, medium and long-term changes to road and rail traffic patterns on the existing network 3. Project-wide combined effects, as well as cumulative effects with other developments 4. For residential receptors health outcomes assessed will include annoyance, AMI, sleep disturbance and hypertension 5. For sensitive non-residential receptors health outcomes assessed will include annoyance
<p>Traffic and transport</p>	<p>Construction</p> <ol style="list-style-type: none"> 1. Increase in Heavy Goods Vehicles (HGV) movements to and from the airport which could affect journey times, highway capacity and lead to severance or impact road safety 2. Increased patronage of public transport services affecting capacity



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Environmental topic	Scope of assessment
	<ol style="list-style-type: none"> 3. Movements on the highway network causing journey delay, congestion and severance 4. Changes to road layout or functionality leading to journey delay, congestion and severance or impact road safety. <p>Operation</p> <ol style="list-style-type: none"> 1. Increased patronage of public transport services impacting upon capacity 2. Movements on the highway network causing journey delay, congestion and severance or impact road safety 3. Increase in freight movements to and from the airport which could affect journey times, highway capacity and lead to severance or impact road safety.
Water	<ol style="list-style-type: none"> 1. <u>Changes to channel routing</u> Modification (by the proposed runway location) of existing routes of the Colne Brook, Wraysbury River, River Colne, Duke of Northumberland's River and Longford River. Realignment of all of these rivers would be required, with new channels being created. A covered river corridor would pass beneath the new runway 2. <u>Loss of floodplain storage and changes to the extent of the fluvial flood plain</u> Loss of floodplain storage associated with channel route modification and realignment (as above) and consequent changes in the fluvial floodplain for up and downstream receptors. 3. <u>Increased runoff</u> Increased area of impermeable surfaces including runway, taxiways, aprons, buildings and other areas of hardstanding. Associated increased potential for runoff. Potential for runoff to be captured in drainage systems and released to a different catchment, for example the discharge of rainfall that falls in the catchment of the River Crane into the River Colne or Portlane Brook. Increased area of hardstanding and other unvegetated surfaces in construction working areas, and associated increased potential for runoff. Dewatering during construction (for example from borrow pits, earthworks, and tunnel and foundation construction), which could be released to surface waters 4. <u>Changes to baseflow</u> Potential for altered flow regime downstream of diverted reaches, if flow is not redistributed according to baseline conditions. Potential for reduced flows to all surface water receptors associated with reduced groundwater flow and/or levels. Potential for increased flows from dewatering during construction, which could be released to surface waters. Managed release of runoff from drainage systems, which could be released to a different catchment. 5. <u>Altered flow conveyance through flow diversions</u> Shortening/ lengthening/ straightening of existing channel flowpaths. Modifications to cross-sectional capacity.



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Environmental topic	Scope of assessment
	<ol style="list-style-type: none"> <li>6. <u>Changes to channel morphology (Operation only)</u> The creation of new channels, alterations to channel form and length, and associated changes to the flow regime, could result in changes to erosion and deposition processes over time, altering channel morphology. <li>7. <u>Increased sediment loading to surface water (Construction only)</u> Ground disturbance and associated sediment mobilisation associated with the construction of new river channels, the process of diverting flows in to those channels, and subsequent flow through new channels. Ground disturbance and dewatering from other construction areas. <li>8. <u>Reduction in surface water quality</u> Transfer of water between different surface water bodies, associated with channel diversions and combining multiple channels. Changes to in-channel processes associated with flow through a covered river corridor. Changes to dilution capacity resulting from changes to baseflow. <li>9. <u>Introduction of pollutants to surface waters</u> Runoff from construction areas and/or new permanent impermeable surfaces, including runoff from areas where de-icing is carried out. Accidental spillage or leakage of fuels, lubricants or other chemicals required for construction and/or operation. <li>10. <u>Increased atmospheric deposition of pollutants to surface waters (Operation only)</u> Changes to air quality associated with increased emissions from aircraft and land-based vehicular traffic during the operational phase of the DCO Project. <li>11. <u>Reduced recharge (Operational phase only)</u> Reduced and/or locally displaced recharge to the superficial gravel aquifer due to increased impermeable surfaces and collection of rainfall runoff in drainage systems, with subsequent release to surface waters. <li>12. <u>Changes to local groundwater flow and levels</u> Construction activities such as the use of coffer dams or sheet piling and the development of borrow pits. Dewatering during construction. Extraction of gravels. Changes to the permeability of subsurface fill material. Influence of new or relocated permanent engineered structures, for example. re-designed and or re-purposed landfill sites, basements, tunnels, pipelines and any other sub-surface structures (for example an airfield drainage network). Realignment of rivers and other surface water bodies such as flood storage areas.



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Environmental topic	Scope of assessment
	<p>13. <u>Changes to groundwater quality</u> Accidental spillage or leakage of fuels, lubricants or other chemicals required for construction and/or operation at the surface, with infiltration to the superficial aquifer. Where pathways exist or are created, there is some potential for contamination to reach the Lambeth Group/Chalk.</p> <p>14. <u>Impacts on the local capacity of the foul drainage network</u> Increased discharge of foul drainage in either the construction or operation phases leading to reduction of down pipe capacity, causing an increase in frequency of sewer flooding.</p> <p>15. <u>Impacts on the capacity of the local public water supply network</u> Increased water demand from the site in the construction and operation phases effecting the sustainability of supply in the local water resource zone.</p>



4.6 Cumulative effects assessment

- 4.6.1 Schedule 4 of the EIA Regulations requires an ES to include an assessment of cumulative effects, which are described as:

“the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.”

- 4.6.2 The need for a cumulative effects assessment is also referred to in the revised draft ANPS (paragraph 4.14):

“When considering significant cumulative effects, any environmental statement should provide information on how the effects of an applicant’s proposal would combine and interact with the effects of other development (including projects for which consent has been granted, as well as those already in existence if they are not part of the baseline).”

- 4.6.3 When considering cumulative effects associated with the DCO Project in the EIA, there are two stages to the cumulative effects assessment:

1. **Stage 1: Scheme-wide cumulative effects** – the scale and complexity of the DCO Project means that it has the potential to result in other development that may be consented via a range of mechanisms. The core topic assessments contained in the ES will assess the likely significant effects associated with all development that is anticipated, or has the potential, to form part of the DCO Project. The scheme-wide cumulative effects assessment will then consider the combined environmental effects of the DCO Project and those works resulting from the DCO Project but for which Heathrow is seeking consent outside of the DCO, i.e. the total effects of expansion related development (known as the Scheme)
2. **Stage 2: Cumulative effects with other developments** – this satisfies the requirement of the EIA Regulations to consider the combined effects of the Scheme with ‘other development’ (external to the Scheme). This will consider ‘other development’ in addition to the scheme-wide cumulative effects identified at Stage 1. It is the approach to this stage of the cumulative effects assessment that is described in this section.

- 4.6.4 While there is no standard approach to the assessment of cumulative effects, PINS has issued an advice note for undertaking cumulative effects assessment for NSIPs (Advice Note Seventeen). This provides useful guidance, setting out a four-stage process for the identification and assessment of other development.



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- 4.6.5 The note also refers to three tiers of other development to consider in the cumulative effects assessment:
1. Tier 1 development: under construction, permitted application(s) but not yet implemented, and submitted application(s) not yet determined
 2. Tier 2 development: projects on the PINS Programme of Projects where a scoping report has been submitted
 3. Tier 3 development: projects on the PINS Programme of Projects where a scoping report has not been submitted, development identified in relevant Development Plans (including emerging Development Plans), and development in other plans and programmes where such development is reasonably likely to come forward. It is acknowledged in Advice Note Seventeen that there may be limited publicly available information for plans, policies and programmes.
- 4.6.6 In developing a methodology for the assessment of cumulative effects of the Scheme with other development, Advice Note Seventeen has been carefully reviewed. The proposed approach broadly follows the staged approach set out in the Advice Note, although it is proposed to agree the inclusion/exclusion criteria at an early stage (as part of the first stage) to ensure that only those developments that have the potential to lead to likely significant cumulative effects are included in the assessment. It is not considered that development below the thresholds proposed in the criteria is likely to result in likely significant cumulative effects together with the Scheme. A summary of the proposed approach to the cumulative effects assessment is provided in Table 4.7, with further detail available in **Appendix 4.2: Approach to cumulative effects** which has been consulted on with HSPG and other relevant local authorities through April 2018. Comments and feedback from this consultation, along with comments received through scoping, will feed into the final CEA methodology.

Table 4.7 Summary of proposed approach to cumulative effects assessment

Stage	Description
1a Establish the DCO Project's 'zone of influence' (ZOI) by topic	Establish the Scheme's 'zone of influence' (ZOI) by topic. Each environmental topic has identified the likely spatial ZOI for cumulative effects associated with their topic. Topic ZOIs are shown on Figure 4.1.
1b Identify inclusion/exclusion criteria	Tier 1 developments: proposed inclusion/exclusion criteria have been identified to recognise those developments that have the potential to lead to likely significant effects. These criteria are set out in Appendix 4.2: Approach to cumulative effects (Table 3.1) and have been applied to all planning applications submitted (and are either consented



Stage	Description
	<p>or pending determination) in the last five years over the maximum extent of all topic ZOIs (i.e. the widest topic ZOI area).</p> <p>Tier 2 developments: the proposed criterion would include all projects on the PINS Programme of Projects where a scoping report has been submitted over the maximum extent of all topic ZOIs.</p> <p>Tier 3 developments: developments on the PINS Programme of Projects where a scoping report has not been submitted are considered as Tier 3 development (subject to sufficient comprehensive information being available for a development to enable a robust assessment). Regarding local development plans, a review of plans, policies and programmes has been undertaken to determine the level of available information and identify whether it is reasonably practicable to make accurate predictions about how the proposals in plans, policies and programmes may interact with the scheme to impact on environmental receptors. This review is contained in Appendix 4.2: Approach to cumulative effects (Appendix 3.3: Review of development plans for the cumulative assessment). It is considered that this demonstrates insufficient availability of information to enable a robust assessment of the likely cumulative effects on specific environmental receptors (for example very limited spatial and temporal information which is required, along with further environmental information regarding each of the development sites, to do a meaningful cumulative assessment). Given the lack of published information and the inherent uncertainty as to the delivery of developments referred to in development plans, it is not considered possible to take such developments into account in the cumulative effects assessment beyond their input to transport modelling (where they are taken into account through growth factors applied to future traffic flows) and to inform future population, housing and employment forecasts.</p> <p>Furthermore, it is noted that aspects of the plans, policies and programmes for which a planning application has already been made would automatically be considered through Tier 1 inclusion criteria. Additionally, when development proposals come forward in accordance with plans, policies and programmes in the future these will, in any case, be likely to require an EIA themselves or be accompanied by appropriate technical material where cumulative effects would be assessed.</p>
<p>2 Identify other development in ZOIs using inclusion/exclusion criteria</p>	<p>An initial list of other development has been prepared for EIA scoping purposes using the criteria identified at stage 1b over the maximum extent of all topic ZOIs. This is contained in Appendix 4.2: Approach to cumulative effects (Appendix 3.4: Initial schedule of other developments)</p>



Stage	Description
3 Information gathering	Following scoping, stakeholder feedback and confirmation of the proposed Heathrow planning boundary (which may affect the topic ZOIs and therefore the area of data search for the cumulative effects assessment), the list of other developments will be updated and further information will be collected on each of the developments to be included in the cumulative effects assessment, to allow topics to undertake a robust assessment of cumulative effects. This will include temporal information on each development so the assessment years in which there is the potential for cumulative effects (for example overlapping construction periods) can be determined. Where a development is built out before the DCO Project construction works begin, the development would form part of the future baseline.
4 Assessment	In the PEIR (and subsequently the ES), environmental topics will consider the cumulative effects of the DCO Project with each of the other developments identified as relevant in turn, for all assessment years where there are overlapping activities. A summary of the cumulative effects assessment will be provided in a tabular format similar to that included in PINS Advice Note Seventeen Appendix 2 (Matrix 2), which would include the identification of any mitigation measures and residual cumulative effects.

4.6.7 For environmental assessment purposes it will be necessary to ‘freeze’ the cumulative development list, to allow environmental topics to undertake assessments to be reported in the PEIR/ES. This is expected to be approximately 6 months prior to the publication of the PEIR. The cumulative development list would then be updated for the ES to include any new development that has come forward or changed planning status (and reflect any changes in topic ZOIs driven by any further changes in the DCO Project boundary following Consultation 2). Again, the list of developments is expected to be frozen approximately 6 months prior to the DCO application submissions. Future developments would be monitored post submission of the DCO application and through the examination period to ensure any further cumulative development is considered and assessed appropriately.

4.7 In-combination effects

4.7.1 Regulation 5(2) (e) requires that the EIA must consider the interaction of environmental effects associated with a proposed development. Paragraph 4.15 of the revised draft ANPS also includes reference to the ‘interrelationship between effects’. For the purposes of the EIA for the DCO Project, these are termed ‘in-combination’ effects, referring to the combined environmental effects from the DCO Project (i.e. interaction of environmental factors such as air quality, noise, health etc.) on a single receptor at a single point in time.

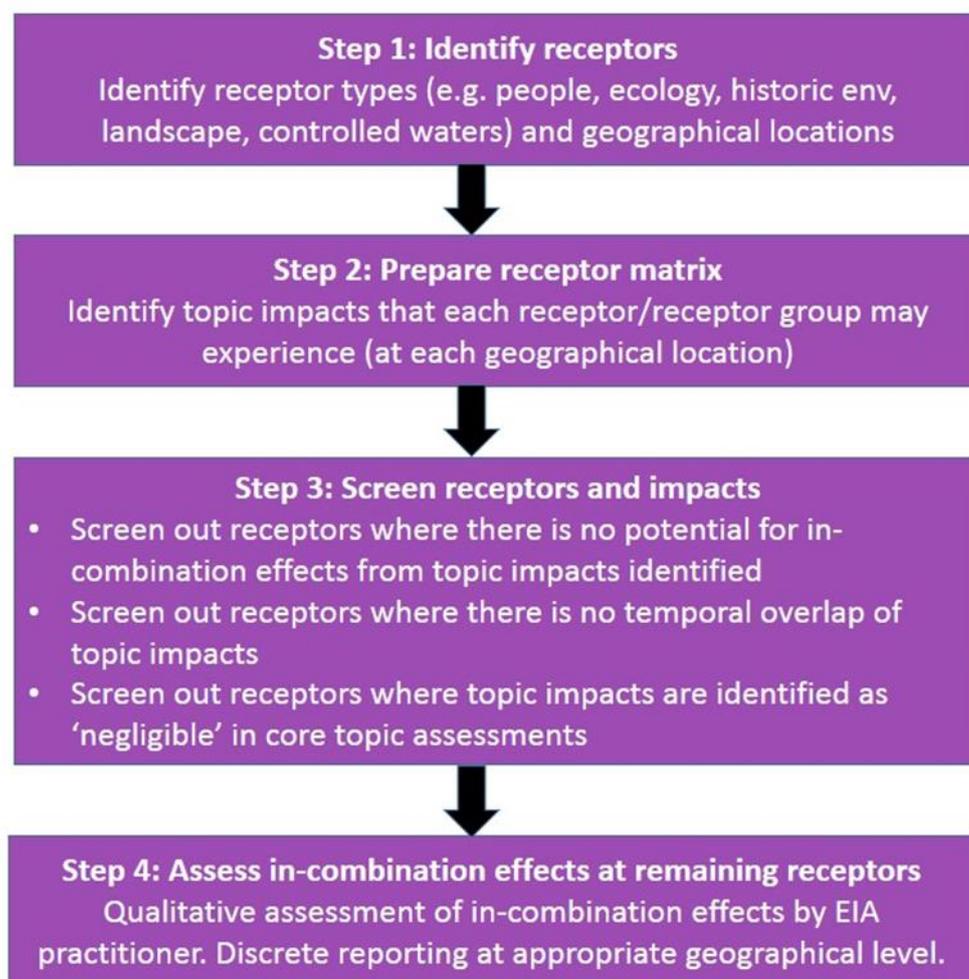


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- 4.7.2 There is no standard approach to the assessment of in-combination effects, with different projects approaching it in different ways. The main difficulty in the assessment of in-combination effects is the inability to undertake the assessment in a quantitative or standardised way given the range of differing impacts that may occur at a receptor as a result of a proposed development. Effects are very rarely additive (i.e. $X + Y = Z$), instead being a collection of impacts on a receptor that need to be drawn together in a meaningful way. Consideration also needs to be given to the potential for ‘synergistic’ effects whereby different types of impact affecting a receptor may interact together to increase their combined significance.
- 4.7.3 The proposed approach to the assessment of in-combination effects for the DCO Project EIA is set out in Graphic 4.1. This follows a receptor-based approach for the consideration of in-combination effects.

Graphic 4.1 Proposed EIA in-combination effects process





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- 4.7.4 The process set out in Graphic 4.1 will be followed for the identification and assessment of in-combination effects during both construction and operation of the DCO Project.
- 4.7.5 Step 4 of the process will comprise a qualitative assessment based on the professional judgement of experienced EIA practitioners. The reporting of in-combination effects will be undertaken on a geographical basis appropriate to the effects identified. For human receptors it is proposed that this is undertaken at a community level, as a suite of community impact reports that would form part of the ES. Each community report would draw together the in-combination effects that a single community may experience during the stages (construction and operation) of the DCO Project. The intention is that this will communicate the environmental effects likely to be experienced by each community in a clear and understandable way, including information on the mitigation strategies to address any likely significant effects identified. Reporting in this way aligns with the revised draft ANPS which places emphasis on how local communities are affected by the DCO Project.
- 4.7.6 The proposed areas for this community-level reporting are shown in Figure 4.1; these are consistent with the community areas defined in the Community Baseline presented in **Appendix 9.2: People, place and community baseline** of this Scoping Report.
- 4.7.7 In-combination effects on the natural environment (ecology, landscape, controlled waters, etc.) would be reported over an appropriate geographical area identified through the process set out in Graphic 4.1. These could be reported at a habitat/catchment level which is likely to be over a wider area than the community areas identified in Figure 4.1.
- 4.7.8 It is considered that the carbon and climate change topics can be scoped out of the in-combination effects assessment. This is on the basis that carbon effects are not location specific and do not interact with other environmental effects. For climate change, topic-specific climate change effects will be reported through topic assessments (and be carried through to the in-combination assessment if appropriate), with no separate input to the in-combination assessment required for the climate change topic.

4.8 Transboundary effects

- 4.8.1 The United Nations Economic Commission for Europe (UNECE) Convention on Environmental Impact Assessment in a Transboundary Context, which was adopted in 1991 as the 'Espoo Convention', was negotiated to enhance the cooperation between European Economic Area (EEA) States in assessing environmental impacts in a transboundary context. The Espoo Convention has



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been implemented by the EIA Directive and transposed into UK law for NSIPs by way of the EIA Regulations, specifically under Regulation 32.

- 4.8.2 Regulation 32 requires that where the Secretary of State is of the view that a development that is the subject of an EIA is likely to have significant effects on the environment of another EEA State a notification is made by the Secretary of State to that other EEA State.
- 4.8.3 As set out in PINS Advice Note 12, the role of PINS, where an NSIP has been identified as an EIA development, includes the screening for likely significant effects on the environment of another EEA State. Screening may take place at any time when new relevant information becomes available. Where a likely significant effect on the environment of any other EEA State(s) is identified, the role of PINS includes the identification of EEA State(s) to be notified, notification of these states, consultation with EEA States, and notification to the EEA State(s) of the outcome of the DCO application.
- 4.8.4 There is no formal role for the applicant under the Regulation 32 process, and there is no statutory requirement for an applicant to include consultation with governmental divisions and interest groups within other EEA States as part of their application under the Planning Act 2008. However, PINS Advice Note 12 makes clear that the decision as to whether or not a development will have a transboundary effect will be based upon the information provided by the applicant, and states that information about the potential for transboundary effects should be provided as part of scoping⁶.
- 4.8.5 Consideration has been given to the potential for transboundary effects on other EEA States as a result of the DCO Project. There are two environmental topics in respect of which it is considered that there could conceivably arise a transboundary effect: carbon and biodiversity.
- 4.8.6 In relation to carbon, GHG emissions impact on the global atmosphere which in turn can give rise to a range of climate change effects that are experienced globally. However, it is not possible to apportion or identify any impact of an increase (or any particular level of increase) in GHG emissions in terms of environmental effects on any particular country or state. It is not anticipated that there is potential for significant effects on the environment of any EEA State or group of EEA States resulting from carbon emissions from the DCO Project, as the environmental receptor in this regard is the global atmosphere, rather than the environment of any country or state or group of countries or states.
- 4.8.7 As such the assessment of transboundary effects on the environment of other EEA State(s) is screened out of the EIA. **Chapter 7: Carbon and other**

⁶ Paragraph 4.1.2-4.1.3



greenhouse gases sets out how we intend to approach the assessment of GHG emissions in relation to the DCO Project.

- 4.8.8 In relation to biodiversity, it is considered to be very unlikely that the DCO Project will have a significant effect on the environment of any EEA State(s). This is expected to be confirmed in the PEIR.

Guidance and best practice

- 4.8.9 In addition to consideration of policy and legislation, the EIA will have regard to relevant guidance and best practice for the assessments.
- 4.8.10 **Appendix 4.3: Guidance and best practice documents** therefore lists all of the guidance and best practice documents which are to be relied upon in the assessments within the topic chapters.

4.9 Engagement

- 4.9.1 Engagement with statutory consultees, local authorities, stakeholders and other interested organisations in relation to the DCO Project is underway.
- 4.9.2 Engagement has been ongoing with statutory bodies including the Environment Agency, Natural England and Historic England since the early stages of the DCO Project, and this has been feeding in to the design work undertaken to date. Where relevant to individual topics, engagement has also been undertaken with other local organisations including the Colne Valley Regional Park Community Interest Company.
- 4.9.3 Several dedicated groups have also been established for the purposes of consultation and assurance for the DCO Project. These include:
1. Heathrow Strategic Planning Group –The HSPG is formed of 12 core member organisations consisting of local planning authorities and local enterprise partnerships and a number (currently seven) of ‘observing’ organisations. The member organisations are:
 - a. London Borough of Hounslow
 - b. London Borough of Ealing
 - c. Spelthorne Borough Council
 - d. Runnymede Borough Council
 - e. South Bucks District Council
 - f. Slough Borough Council
 - g. Thames Valley Berkshire Local Enterprise Partnership



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- h. Buckinghamshire Thames Valley Local Enterprise Partnership
- i. Enterprise M3 Local Enterprise Partnership
- j. Surrey County Council
- k. Buckinghamshire County Council
- l. Colne Valley Community Interest Company.

2. Air Quality Expert Review Group – a group consisting of experts from four UK universities to provide independent advice focussed on approach and methodology and preliminary consultation prior to wider stakeholder engagement
3. Noise Expert Review Group – a group consisting of experts to provide independent advice focussed on approach and methodology and preliminary consultation prior to wider stakeholder engagement
4. Heathrow Community Engagement Board – an independent body made up of local authorities, airport user groups and community and local interest groups. The Board was a recommendation of the Airports Commission and is a requirement in the draft revised ANPS to give local stakeholders more influence over how the airport operates and grows.

4.9.4 Consultation 1 includes documents relating to specific environmental topics where early views are sought on the approaches to design. These include:

1. Air principles consultation document
2. Our approach to noise
3. Our approach to carbon and climate change
4. Our approach to developing a surface access strategy
5. Our approach to air quality
6. Our design approach to the natural environment
7. Our approach to historic environment.

4.9.5 Further information on the technical engagement undertaken to date is detailed within the topic chapters.



Chapter 5

Air quality and odour



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5. AIR QUALITY AND ODOUR

5.1 Introduction

5.1.1 This chapter describes the scope of the assessment as it relates to air quality and odour. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.

5.1.2 This chapter describes:

1. The air quality and odour policy and legislative context
2. Topic specific stakeholder engagement so far and future proposed engagement
3. The study area for the assessment
4. Sources of data used for scoping
5. Baseline conditions, including current desk studies and surveys
6. Likely significant effects of the DCO Project on air quality and odour
7. Effects not requiring assessment
8. The proposed approach to the assessment
9. Approach to mitigation.

5.2 Policy and legislation

5.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 5: Air quality and odour**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.

5.2.2 The policy and legislation relevant to air quality and odour are detailed in Table 5.1.



Table 5.1 Policy and legislation relevant to the air quality and odour assessment

Relevant policy / legislation	Relevance to assessment
Policy – UK	
<p>Revised draft Airports National Policy Statement (revised draft ANPS)¹</p>	<p>This document confirms the UK Government opinion that expansion of Heathrow (with mitigation) is capable of taking place within air quality legal limits.</p> <p>The requirements for the air quality assessment are detailed, including the requirement to demonstrate to the Secretary of State that the construction and operation of the Northwest Runway will not affect the UK’s ability to comply with legal obligations.</p> <p>It is stated that the environmental statement should assess:</p> <ul style="list-style-type: none"> - <i>“Existing air quality levels for all relevant pollutants referred to in the Air Quality Standards Regulations 2010 and the National Emission Ceilings Regulations 2002 (as amended) or referred to in any successor regulations;</i> - <i>Forecasts of air quality at the time of opening, (a) assuming that the scheme is not built (the ‘future baseline’), and (b) taking account of the impact of the scheme, including when at full capacity; and</i> - <i>Any likely significant air quality effects, their mitigation and any residual likely significant effects, distinguishing between those applicable to the construction and operation of the scheme including any interaction between construction and operational changes and taking account of the impact that the scheme is likely to cause on air quality arising from road and other surface access traffic.”</i> <p>It is stated that air quality considerations are likely to be particularly relevant where the proposed scheme:</p> <ul style="list-style-type: none"> - <i>“is within or adjacent to Air Quality Management Areas, roads identified as being above limit values, or nature conservation sites (including Natura 2000 sites and Sites of Special Scientific Interest);</i> - <i>would have effects sufficient to bring about the need for new Air Quality Management Areas or change the size of an existing Air Quality Management Area, or bring about changes to exceedances of the limit values, or have the potential to have an impact on nature conservation sites; and</i> - <i>after taking into account mitigation, would lead to a significant air quality impact in relation to Environmental Impact Assessment and / or to a deterioration in air quality in a zone or agglomeration.”</i> <p>It is also highlighted that the airport surface access strategy should reference the role of surface transport in relation to air quality.</p>

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant policy / legislation	Relevance to assessment
<p>National Policy Statement for National Networks² (NN NPS)</p>	<p>The nature of the DCO Project means that the National Policy Statement for National Networks could apply to parts of the scheme.</p> <p>The revised draft ANPS states at paragraph 4.8 that "<i>The Secretary of State will consider any relevant nationally significant road and rail elements of the applicant's proposals in accordance with the National Networks NPS and with the Airports NPS. If there is conflict between the Airports NPS and other NPSs, the conflict should be resolved in favour of the NPS that has been most recently designated.</i>"</p> <p>This document details similar requirements for the air quality assessment. The applicant is required to undertake an assessment of the impacts of the proposed project as part of the environmental statement. Of particular note is the requirement to provide a judgement on the risk as to whether the DCO Project would affect the UK's ability to comply with the Air Quality Directive.</p> <p>It is stated The Secretary of State should refuse consent where, after taking into account mitigation, the air quality impacts of the scheme will:</p> <ul style="list-style-type: none"> - "<i>result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or</i> - <i>affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.</i>"
<p>National Planning Policy Framework (NPPF)³</p>	<p>Sets out planning policy for England and places a general presumption in favour of sustainable development. It states that planning decisions should ensure that any new development in AQMAs is consistent with the local air quality action plan.</p> <p>With regards to odour, it is stated that the effects of pollution on general amenity, and the potential sensitivity of the area to negative effects from pollution, should be taken into account.</p> <p>The revised draft NPPF currently in consultation⁴ contains further guidance and states that:</p> <p><i>"Opportunities to improve air quality or mitigate impacts should be identified, such as through traffic and travel management, and green infrastructure provision and enhancement. So far as possible these opportunities should be considered at the plan-making stage, to ensure a strategic approach and limit the need for issues to be reconsidered when determining individual applications."</i></p>
<p>The 2007 Air Quality Strategy for England, Scotland Wales and Northern Ireland⁵</p>	<p>The Environment Act 1995 required the adoption of an Air Quality Strategy containing standards, objectives and measures for improving ambient air quality.</p>

² Department for Transport, National Policy Statement for National Networks, 2014

³ Department for Communities & Local Government, National Planning Policy Framework, 2012

⁴ Draft Revised National Planning Policy Framework, Ministry of Housing & Local Government, 2018.

⁵ Defra et al, The Air Quality Strategy for England, Scotland Wales and Northern Ireland, 2007



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Relevant policy / legislation	Relevance to assessment
	<p>The 2007 Air Quality Strategy is designed to meet that requirement and provides a framework for improving air quality at a national and local level and supersedes the previous strategy published in 2000. It imposes a number of obligations on local authorities to manage air quality. Central to the Air Quality Strategy are health-based criteria for certain air pollutants; these criteria are based on medical and scientific reports on how and at what concentration each pollutant affects human health and mirror the AQOs set out in the Air Quality (England) Regulations 2000. The AQOs are policy targets often expressed as a maximum ambient concentration not to be exceeded, either without exception or with a permitted number of exceedances, over a specified averaging period.</p>
<p>Aviation Policy Framework 2013⁶</p>	<p>The Aviation Policy Framework recognises that air quality in AQMAs or where limit values are exceeded is particularly sensitive to new developments or transport pressures, and that cumulative impacts from different individual sites can exacerbate this.</p> <p>It is stated that “Airports are large generators of surface transport journeys and as such share a responsibility to minimise the air quality impact of these operations. The Government expects them to take this responsibility seriously and to work with the Government, its agencies and local authorities to improve air quality.”</p>
<p>UK plan for tackling roadside nitrogen dioxide concentrations⁷</p>	<p>This plan, published in 2017, details how the Government plans to reduce NO₂ concentrations in those areas where they exceed the EU limit value, in the shortest time possible. The plan lists specific actions that will be taken to address the immediate health risks presented by poor air quality at particular locations in the country.</p>
<p>Beyond the horizon. The future of UK aviation. Next steps towards an aviation strategy 2018⁸</p>	<p>This document states that: “Surface transport continues to be the main contributor to local air quality emissions around airports which will be tackled through approaches such as the air quality plan for nitrogen dioxide published last year”.</p>
<p>Legislation – International</p>	
<p>Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe (the Directive)⁹</p>	<p>This Directive consolidates existing European Union (EU)-wide air quality legislation and provides a new regulatory framework for PM_{2.5}. The Directive sets limit values (EU limit values) for selected pollutants that are to be achieved by specific dates and also details procedures that EU Member States should take in assessing ambient air quality. Regulated pollutants include sulphur dioxide (SO₂), nitrogen dioxide (NO₂), oxides of nitrogen (NO_x), particulate matter (PM₁₀ and PM_{2.5}), lead (Pb), benzene (C₆H₆) and carbon monoxide (CO).</p>

⁶ Secretary of State for Transport, Aviation Policy Framework, 2013

⁷ Defra, UK plan for tackling roadside nitrogen dioxide concentrations, 2017

⁸ Department for Transport, Beyond the horizon. The future of UK aviation. Next steps towards an aviation strategy, 2018

⁹ Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe, 2008



Relevant policy / legislation	Relevance to assessment
	<p>In the UK, only monitoring and modelling carried out by UK Central Government meets the specification required to assess compliance with the EU limit values. The Department for Environment, Food and Rural Affairs (Defra) assesses compliance using the Pollution Climate Mapping (PCM) model and the Automatic Urban and Rural Network (AURN) of monitoring sites. Concentrations are predicted using the PCM model at locations 4m from the kerbsides of major road network links where the public may be exposed. The base year PCM modelled results (most recent base year is 2015) are calibrated against measured concentrations from the AURN and then verified.</p> <p>The Directive is transposed into UK legislation through the Air Quality Standards Regulations 2010¹⁰. The UK Government has prepared the <i>Air quality plan for nitrogen dioxide (NO₂) in UK (2017)</i> to meet requirements of the Directive.</p>
Legislation – UK	
<p>Part IV of the Environment Act 1995¹¹</p>	<p>Requires that Local Authorities periodically review air quality within their individual areas. This process of Local Air Quality Management (LAQM) is an integral part of delivering the Government's 'air quality objectives' (AQOs).</p> <p>AQOs are objectives for the restriction of the levels at which particular substances are present in the air, and are set out in the Air Quality (England) Regulations 2000, prepared pursuant to section 87(2)(b) of the Environment Act 1995 (which allows the Government to make regulations setting AQOs).</p> <p>From the 2016 reporting year, Defra introduced a streamlined process with a single Annual Status Report for reporting on LAQM.</p> <p>Where assessment indicates that some or all of the AQOs may be potentially exceeded, the Local Planning Authority has a duty to declare an Air Quality Management Area (AQMA). The declaration of an AQMA requires the Local Planning Authority to implement an Air Quality Action Plan.</p>
<p>The Air Quality Standards Regulations 2010</p>	<p>The Air Quality Standards Regulations 2010 came into force on 11 June 2010 and transpose Directive 2008/50/EC into UK legislation. The limit values in Directive 2008/50/EC are transposed into the Regulations with attainment dates in line with the Directive.</p>
<p>National Emission Ceilings Regulations 2018¹²</p>	<p>The National Emission Ceilings Regulations 2018 come into force on 1 July 2018 and transpose Directive 2016/2284/EU on the reduction of national emissions of certain atmospheric pollutants into UK legislation. The Secretary of State must prepare an inventory of emissions of specified pollutants (including SO₂, NO_x, CO, PM₁₀, PM_{2.5} and Pb which</p>

¹⁰ The Air Quality Standards Regulations 2010 Statutory Instrument 2010 No. 1001, 2010

¹¹ Environment Act 1995

¹² The National Emission Ceilings Regulations 2018 Statutory Instrument 2018 No. 129, 2018



Relevant policy / legislation	Relevance to assessment
	<p>also have AQOs) occurring within the United Kingdom every year and prepare projections of emissions every two years.</p> <p>The Secretary of State must ensure that the total anthropogenic emissions occurring within the United Kingdom for each of the specified pollutants do not exceed specified amounts (up to and including 2019) or specified percentages of base year emissions (in 2020 and after).</p> <p>The Secretary of State must also prepare and implement a national air pollution control programme in order to limit anthropogenic emissions in accordance with the national emission reduction commitments.</p>

5.2.3 Due regard will also be given to local policies and the Government’s 25 year environment plan where they are relevant.¹³

5.3 Stakeholder engagement

5.3.1 This chapter has been informed by engagement and discussion with various stakeholders. The engagement undertaken to date and proposed future engagement is detailed in Table 5.2.

Table 5.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Heathrow Strategic Planning Group (HSPG)¹⁴	<p>The first meeting was held on 9 November 2017 in which the purpose of the group was established (to work collaboratively in creating and delivering a vision for the Heathrow sub-region and enabling coordinated and consistent management of benefits and impacts). An overview of the DCO Project was provided along with a high-level summary of Heathrow’s approach to air quality assessment.</p> <p>The second meeting was held on 8 February 2018, to provide a project update, discuss EIA scoping and the published Consultation 1 materials.</p> <p>Several comments were made by the HSPG regarding the assessment methodology and the extent of the study area.</p> <p>Hounslow and Spelthorne noted that the assessment should make use of the air quality</p>	Further meetings will be held on a quarterly basis throughout the duration of the DCO Project.

¹³ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018

¹⁴ The membership of the HSPG is set out in Section 4.9: Engagement



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>monitoring data collected by local authorities. It is proposed that automatic monitoring data collected by local authorities will be used in the dispersion modelling verification process. Model performance will also be evaluated using appropriate diffusion tube data.</p> <p>Slough requested that the effect on pollutant concentrations in the Brands Hill AQMA should be assessed. As a result, the illustrative core assessment area encompasses the Brands Hill AQMA.</p> <p>South Bucks and Buckinghamshire County Council requested that impacts on designated ecological sites (e.g. Burnham Beeches Special Area of Conservation) should be assessed where traffic data indicate that there may be the potential for significant negative effects. As a result, it is proposed that impacts will be assessed where predicted traffic data indicate that trip generation could potentially result in significant effects. This will be considered in Chapter 6: Biodiversity.</p> <p>It was noted that the assessment must adequately consider potential impacts during construction, including cumulative impacts of expansion alongside other major development. Impacts during the construction phase will be considered, as detailed in Section 5.9: Proposed approach to the assessment.</p>	
<p>Highways England</p>	<p>An initial meeting was held on the 7 September 2017. This was followed by a meeting to discuss the scope of the assessment which took place on the 8 March 2018.</p> <p>Reference was made to current government guidance that is available. The Highways Agency (now Highways England) Design Manual for Roads and Bridges (DMRB)¹⁵ contains guidance that can be used for screening of roads that are likely to be affected by proposals. It is proposed that the screening criteria from the DMRB are used in determining the roads included in the</p>	<p>Further meetings to be held with the relevant technical expert.</p>

¹⁵ Highways Agency, Design Manual for Roads and Bridges. Volume 11. Section 3. Environmental Assessment Techniques. Part 1. HA207/07. Air Quality, 2007



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>study area, as detailed in Section 5.4: Study area.</p> <p>Interim Advice Note 174/13¹⁶ provides guidance on the evaluation of significance for Highways Agency schemes. It is proposed that this guidance is used for the assessment, as discussed in Section 5.9.</p> <p>Interim Advice Note 175/13¹⁷ provides guidance on the assessment of compliance with the EU limit value.</p>	
Environment Agency	<p>An engagement meeting was held with the Environment Agency on the 23 April 2018. The proposed scope of assessment was presented. It was confirmed that the role of the Environment Agency as a statutory consultee will not cover air quality, however it will need to be consulted should any particular aspect of the DCO Project require an Environmental Permit.</p>	<p>Engagement on specific aspects of the DCO Project to be carried out as and when required.</p>

5.4 Study area

- 5.4.1 This section presents study areas for local air quality, assessing compliance with EU limit values, construction dust and odour.
- 5.4.2 As set out below, as the design and consultation processes progress and the DCO Project is refined, the exact geographical scope of study areas may continue to evolve to accommodate any changes that are generated in accordance with the criteria explained below. If the study areas change, data collection will also be reviewed and updated.

Assessment against Air Quality Objectives

- 5.4.3 The study area proposed for local air quality area (i.e. the area over which pollutant concentrations will be predicted for comparison with the AQOs) has been determined on the basis of emission sources and their relative impacts on air quality at sensitive receptor locations. As distance from the Airport boundary increases, the influence of emissions from aircraft and airfield activity on pollutant

¹⁶ Highways Agency, Interim Advice Note 174/13 Updated advice for evaluating significant local air quality effects for users of DMRB Volume 11, Section 3, Part 1 'Air Quality (HA207/07), 2013

¹⁷ Highways Agency, Interim Advice Note 175/13 Updated air quality advice on risk assessment related to compliance with the EU Directive on ambient air quality and on the production of Scheme Air Quality Action Plans for user of DMRB Volume 11, Section 3, Part 1 'Air Quality, 2013



concentrations decreases and road traffic becomes the most important source of local emissions, and will dictate the spatial scale of the area over which project related effects on local air quality will be assessed.

- 5.4.4 For the reasons explained below, the illustrative core assessment area for consideration of pollutant concentrations against the AQOs comprises a 12km x 11km area centred on Heathrow, which will extend from the Brands Hill AQMA in the west to Hounslow in the east. This is shown in Figure 5.1. Pollutant concentrations will be predicted across this core assessment area.
- 5.4.5 The 12km x 11km area is based on consideration of the emission sources and their relative impacts, and previous dispersion modelling studies that have been carried out, including those undertaken on behalf of Heathrow¹⁸ and by the Airports Commission¹⁹. These studies show that the 12km x 11km area includes the locations where changes in air quality (due to airfield, aircraft and road traffic emissions) are likely to be greatest and that changes in pollutant concentrations outside of this area will be lower and negligible in most cases.
- 5.4.6 Aircraft on approach and departure from Heathrow have a limited impact on ground-level pollutant concentrations beyond the Airport boundary as aircraft are high enough that emissions are diluted by atmospheric diffusion before reaching the ground. Therefore, the illustrative core assessment area includes all locations closest to the airport where there may be potential for air quality effects from aircraft emissions on the ground and in the air.
- 5.4.7 Other sources of emissions within the Airport such as those associated with heating and power generation are also not expected to have any impact on pollutant concentrations outside of the proposed 12km x 11km core assessment area.
- 5.4.8 Any impacts outside the illustrative core assessment area will therefore be dictated by potential changes in the number of airport-related road traffic movements and their associated emissions. As such, the area over which pollutant concentrations and their impact on AQOs will be assessed may also be extended to include other discrete areas, with relevant exposure, where traffic modelling indicates that traffic movements (including those in relation to construction traffic) on links outside of the proposed 12km x 11km core assessment area are likely to be affected (Other road links where compliance with EU limit values is assessed will also be considered separately, as detailed below).

¹⁸ Amec for Heathrow, Heathrow Airport Limited Heathrow's North-West Runway Air Quality Assessment, 2014

¹⁹ Jacobs for the Airports Commission, Module 6: Air Quality Local Assessment Detailed Emissions Inventory and Dispersion Modelling, 2015



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- 5.4.9 Road links will be considered to be potentially affected by the DCO Project if any of the following criteria detailed in the DMRB¹⁵ apply:
1. Road alignment will change by 5 m or more
 2. Daily traffic flows will change by 1,000 Annual Average Daily Traffic (AADT) or more
 3. HDV flows will change by 200 AADT or more
 4. Daily average speed will change by 10km/hr or more
 5. Peak hour speed will change by 20km/hr more.
- 5.4.10 Further details on road traffic modelling (which will provide the vehicle data that will be used to determine if the criteria have been met) can be found in **Chapter 17: Traffic and transport**.
- 5.4.11 In 2007 a screening criterion of a change in AADT of 1,000 vehicles was defined in the DMRB based on the predicted impact of this number of vehicles in the near future. Average emissions per vehicle have reduced since this guidance was published in 2007. With progressive tightening of emissions standards, average emissions per vehicle in the opening year of the DCO Project (anticipated 2026) would be considerably lower than for a scheme opening in, for example, 2015 (63% lower as calculated using Emissions Factors Toolkit v8.0.1²⁰). Therefore, the change in roadside concentrations in the opening year that would be attributable to 1,000 vehicles would be substantially less than in earlier assessment years, thus the screening criterion is considered to be robust when taking into account the relative emissions in 2007, when the guidance was produced, and potential earliest assessment years.
- 5.4.12 If a link outside of the core assessment area is added to the assessment, the assessment methodology will be the same as that carried out within the core assessment area and will focus on the impact of changes in road traffic emissions. Emissions from vehicles on primary roads within 200m of the affected link will be modelled.

Assessment of compliance with EU limit values

- 5.4.13 NO₂ concentrations will be considered at key PCM assessment locations within the 12km x 11km core assessment area that has been defined above in relation to assessment against the AQOs. Additional PCM road links between the airport and Central London where any changes in airport-related traffic may affect the compliance status of the Greater London Agglomeration will also be considered.

²⁰ Emissions Factors Toolkit, <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html> (accessed 02 May 2018)



These locations will include the links with the highest predicted baseline concentrations in each assessment year and also those locations where compliance with the NO₂ EU limit value is predicted to be achieved latest in the Agglomeration. The assessment locations will include all of those considered in work carried out on behalf of the Department for Transport (DfT)²¹ and are shown in Figure 5.2.

- 5.4.14 The assessment methodology will focus on the increment in road traffic related NO₂ concentrations as a result of the DCO Project. Emissions will be modelled from vehicles on the affected PCM link and primary roads within 200m of the affected link.

Construction dust

- 5.4.15 The study area for construction dust impacts will be informed by Greater London Authority (GLA)²² and IAQM Guidance on the assessment of dust from demolition and construction²³. Assessment will be carried out for all individual work sites where there is a human receptor within:
1. 350m of any particular boundary of the relevant Project site
 2. 50m of the route(s) used by construction vehicles on the public highway or haul routes, up to 500m from the site entrance(s).
- 5.4.16 Assessment will be carried out where there is an ecological receptor within:
1. 50m of the boundary of the relevant Project site
 2. 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

Odour

- 5.4.17 It is recognised that different sources of odour will affect receptors over different distances due to the varying strength and nature of emissions. Assessment will be carried out for all odour sources identified that could potentially have an impact on receptors (during the construction and operation phases). Specific assessments for individual sources will be informed by the strength and nature of the odour emission source (e.g. land preparation, aircraft movements), the pathway for odour flux to receptor (e.g. distance and direction in relation to prevailing wind

²¹ 2017 Plan Update to Air Quality Re-Analysis Impact Of 2017 Air Quality Plan and Associated Pollution Climate Mapping Sensitivity Testing for Department for Transport. 2017

²² Greater London Authority, The Control of Dust and Emissions during Construction and Demolition Supplementary Planning Guidance, 2014

²³ Institute of Air Quality Management (IAQM), Guidance on the Assessment of Dust from Demolition and Construction, 2014



direction), and analysis of odour complaints received in relation to present operations. This approach is in accordance with IAQM guidance²⁴. It is anticipated that sources and receptors of odour emissions will be considered within the same 12km x 11km core assessment area for consideration against AQOs. Where there are construction work sites outside of the illustrative core assessment area (if any), these will be assessed in the same way as for other sources.

5.5 Sources of data used in scoping

Desk study

- 5.5.1 As a result of the work undertaken in relation to the LAQM regime, and national assessments of compliance with EU limit values, a significant amount of air quality monitoring data is available for the local air pollutants which have been subject to exceedances of either the AQOs or EU limit values. These are NO₂ and fine particulate matter (PM₁₀ and PM_{2.5}, collectively referred to as PM). The annual mean EU limit value and AQO for both NO₂ and PM₁₀ is 40 µg/m³. The AQOs are provided in Table 5.3. This also provides the short-term AQOs for each pollutant. For NO₂, it is the annual mean AQO that is the more stringent AQO; it is generally considered that the 1-hour mean NO₂ AQO will not be exceeded if the annual mean AQO is not exceeded. For PM₁₀, the 24-hour mean AQOs is more stringent than the annual mean. The EU limit values for NO₂ and PM₁₀ are the same numerical concentrations as the AQOs, but achievement of these values is a national obligation rather than a local one.
- 5.5.2 Heathrow is located within the London Borough of Hillingdon. The Local Planning Authority administrative areas that neighbour Hillingdon, and which have the potential to be affected by the air quality impacts of the construction and operation of Heathrow, include the London Borough of Hounslow (to the east and south-east of the Airport), Spelthorne Borough Council (to the south and south-west of the Airport), Slough Borough Council (to the west of the Airport) and South Bucks District Council (to the north of the Airport).
- 5.5.3 The principal source of air quality monitoring data is the Heathrow Airwatch website²⁵, which is funded by Heathrow and overseen by a joint working partnership consisting of the London Boroughs of Hillingdon and Hounslow, Slough and Spelthorne Borough Councils and Heathrow.
- 5.5.4 There is a range of automatic monitoring stations within the Boroughs that cover the different categories of representative locations (e.g. urban background, roadside, airport). The pollutant concentrations recorded at each site are related to

²⁴ Institute of Air Quality Management (IAQM), Guidance on the Assessment of Odour for Planning, 2014

²⁵ Air Quality at Heathrow <http://www.heathrowairwatch.org.uk/> (accessed 02 May 2018)



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the specific location of the monitoring station relative to nearby emission sources, including road traffic and airport emissions sources, in combination with the local and regional background concentrations of each pollutant.

- 5.5.5 Annual mean NO₂ concentrations, recorded using diffusion tubes, were also obtained from Local Planning Authority LAQM Review and Assessment reports that are produced each year in accordance with Defra requirements. The reports can be found on the relevant air quality pages of the Ealing, Hillingdon, Hounslow, Slough, South Bucks, Spelthorne and Windsor and Maidenhead Local Planning Authority websites.
- 5.5.6 Data has also been obtained from the assessment of compliance with EU limit values carried out by Defra. In association with the *UK plan for tackling roadside nitrogen dioxide concentrations*²⁶, NO₂ concentrations were modelled using the PCM model for several different future scenarios to consider the measures required to achieve compliance²⁷.

Baseline surveys

- 5.5.7 Concentrations of NO₂ and PM are routinely monitored in the area by Heathrow and the local authorities. Due to the length of time that data have been collected (over 20 years) and the number of monitoring sites currently maintained, it is considered that existing data are sufficient to provide a robust baseline. Therefore, no supplementary baseline surveys to those described in this paragraph have been completed to inform the Scoping Report.
- 5.5.8 No baseline PM, dust deposition and odour surveys have been undertaken. Monitoring of baseline PM, dust deposition and odour levels will be undertaken in advance of commencement of the construction programme.

5.6 Baseline conditions

Ambient air quality

- 5.6.1 Air quality in the Heathrow region has been a particular concern in the last two decades and has been assessed through both ambient air quality monitoring and modelling studies. Previous dispersion modelling²⁸ has shown that in the area outside of the Airport boundary, the main sources of pollution that influence air quality are non-airport-related. Emissions source apportionment showed that, in

²⁶ Defra, UK plan for tackling roadside nitrogen dioxide concentrations, 2017

²⁷ Defra, 2017 NO₂ projections data (2015 reference year)

<https://uk-air.defra.gov.uk/library/no2ten/2017-no2-projections-from-2015-data> (accessed 02 May 2018)

²⁸ Ricardo-AEA, Heathrow Airport 2013 Air Quality Assessment, 2015



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decreasing order of influence, pollutant concentrations beyond the Airport boundary are affected by:

1. The ambient background (pollutants transported from elsewhere, including London and northern Europe)
2. Non-airport-related road traffic (trips in the modelled area not starting or ending at the Airport)
3. Airport-related road traffic (trips starting at or ending at the Airport)
4. Emissions from on-airport activities.

- 5.6.2 Nitrogen oxides (NO and NO₂) are emitted as a result of combustion processes (e.g. from vehicles, aircraft and heating plant). Emissions are expressed in terms of the NO_x (the sum of NO and NO₂), whereas human health effects relate to NO₂. Although some NO₂ is emitted directly in the engine exhaust, additional NO₂ is formed following release, principally via the interaction of NO with background ozone (O₃). Thus, emissions of both NO and NO₂ are important.
- 5.6.3 PM is also emitted from combustion processes. For PM there are additional non-exhaust contributions, including brake wear, tyre erosion, road abrasion and resuspension.

Local air quality management

- 5.6.4 The AQOs that apply in the LAQM process are detailed in Table 5.3.

Table 5.3 UK air quality objectives and pollutants – LAQM

Pollutant	Concentration	Measured as
Benzene	16.25 µg/m ³	Running annual mean
	5.00 µg/m ³	Running annual mean
1,3-Butadiene	2.25 µg/m ³	Running annual mean
Carbon monoxide	10.0 mg/m ³	Running 8-hour mean
Lead	0.25 µg/m ³	Annual mean
Nitrogen dioxide	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM_{2.5})	Work towards reducing	Annual mean



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Pollutant	Concentration	Measured as
	emissions/concentrations of fine particulate matter (PM _{2.5})	
Sulphur dioxide	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

- 5.6.5 As part of the LAQM Review and Assessment process, several AQMAs have been declared in the area. These AQMAs were declared because annual average concentrations of NO₂ were found to be above the annual mean AQO of 40 µg/m³ at certain locations, including those close to busy roads and motorways. However, the NO₂ annual mean AQO is not exceeded everywhere in each AQMA.
- 5.6.6 The London Borough of Hillingdon declared an AQMA in 2001, which was then extended in 2003 to cover all parts of the borough south of the Chiltern-Marylebone railway line. Heathrow sits within the southern part of this AQMA. The councils of Hounslow, Spelthorne and Slough have declared AQMAs in their boroughs. Hounslow amalgamated four existing AQMAs into one AQMA to encompass the whole Borough and Spelthorne declared the whole Borough an AQMA. Slough has declared four AQMAs; including AQMA No.2 which encompasses the A4 London Road east of junction 5 of the M4 motorway as far as Sutton Lane, in Brands Hill, approximately 3km to the west of Heathrow. These AQMAs are shown in Figure 5.3. South Bucks District Council is currently consulting on the declaration of a proposed new AQMA in Iver²⁹.
- 5.6.7 In the boroughs of Hillingdon, Hounslow, Spelthorne and Slough, concentrations of the other significant air pollutants that can affect public health, including PM₁₀ and PM_{2.5}, already meet the AQOs and are forecast to continue to do so into the future.

Air quality monitoring

Automatic monitoring

- 5.6.8 There are currently over twenty continuous air quality monitoring stations detailed on Heathrow Airwatch. One of these monitoring stations is located within the

²⁹ South Bucks District Council, Consultation: Proposed New Air Quality Management Area in Iver, 2018 <http://www.southbucks.gov.uk/Iver-AQMA-consultation> (accessed 02 May 2018)

³⁰ London Borough of Hillingdon, Air Quality Action Plan Progress Report, 2007



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Airport boundary (called LHR2), and several of these are located immediately within the vicinity of Heathrow (Heathrow Oaks Road, Heathrow Green Gates, Sipson, Oxford Avenue, Cranford and Hatton Cross). Details of the monitoring stations in the area surrounding Heathrow and within the illustrative core assessment area, along with measured annual mean concentrations of NO₂, PM₁₀ and PM_{2.5} from 2012 – 2016, are provided in Table 5.4, Table 5.5 and Table 5.6. Monitoring station locations are provided in Figure 5.4.

- 5.6.9 These data confirm that PM₁₀ concentrations do not exceed the annual AQO. NO₂ concentrations exceed the annual mean AQO at some roadside monitoring sites, but the concentration is below 40 µg/m³ at other roadside sites, and background locations.

Nitrogen dioxide diffusion tubes

- 5.6.10 NO₂ diffusion tube monitoring data is available at a much larger number of sites than the continuous air quality monitoring stations. Data have been taken from the 2017 LAQM Annual Status Reports (ASRs) produced by each Local Planning Authority. The data is summarised in Figure 5.5.
- 5.6.11 The pattern seen at automatic monitoring stations is repeated. NO₂ concentrations exceed the annual mean AQO at some roadside monitoring sites, but the concentration is below 40 µg/m³ at other roadside sites, and background locations.

Other pollutants

- 5.6.12 Concentrations of CO, SO₂ and benzene were previously monitored in the London Borough of Hillingdon. Successive LAQM reports^{30 31 32} confirmed that all of the relevant AQOs for these pollutants had been achieved and therefore there was no risk of the AQOs being exceeded.
- 5.6.13 In 2007, the maximum daily running 8-hour CO mean at all monitoring stations was well below 1µg/m³ (0.3 to 0.5µg/m³), compared to the AQO of 10µg/m³. The 1-hour mean, 24-hour mean and 15-minute mean SO₂ AQOs were all achieved and the annual mean benzene concentrations at all diffusion tube monitoring sites was around 2µg/m³ (1.9 to 2.2µg/m³), compared to the AQO of 5µg/m³.
- 5.6.14 As concentrations of these pollutants were so low in the area, monitoring was discontinued and no recent data is available. Monitoring of CO was discontinued at the AURN sites in Hillingdon in 2007 and 2008. Benzene monitoring was

³⁰ London Borough of Hillingdon, Air Quality Action Plan Progress Report, 2007

³¹ London Borough of Hillingdon, Air Quality Action Plan Progress Report, 2008

³² London Borough of Hillingdon, Air Quality Action Plan Progress Report, 2009



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discontinued in 2010³³. Monitoring of SO₂ concentrations at the London Hillingdon AURN monitoring station was discontinued in 2007³⁴.

- 5.6.15 Although O₃ is not considered by local authorities as part of the LAQM process, concentrations of O₃ are monitored at the AURN sites in the London Borough of Hillingdon (London Harlington and London Hillingdon). The 2016 concentration at London Hillingdon was 25µg/m³ and the concentration at London Harlington was 34µg/m³.

³³ London Borough of Hillingdon, Air Quality Action Plan Progress Report, 2011

³⁴ Site Information for London Hillingdon (UKA00266)

https://uk-air.defra.gov.uk/networks/site-info?site_id=HIL (accessed 02 May 2018)



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Table 5.4 Automatic air quality monitoring station details and measured annual mean NO₂ concentrations (µg/m³)

Site name	Type	OS Coordinates		Height (m)	Distance to kerb (m)	Road	Annual mean NO ₂ concentrations (µg/m ³)				
		X (m)	Y (m)				2012	2013	2014	2015	2016
London Hillingdon	Suburban	506943	178608	3	35	M4	57	53	57	52	52
LHR2	Airport	508392	176743	3	12.5	Northern Perimeter Road	48	48	46	44	47
Heathrow Oaks Road	Urban Background	505737	174496	3	4	Oaks Road (minor road)	30	34	33	27	31
Heathrow Green Gates	Airport	505184	176922	3	13	Bath Road	33	34	35	32	35
Hillingdon Oxford Avenue	Roadside	509554	176977	1.7	21	Bath Road (A4)	43	39	32	32	40
HS2 - Cranford	Background	510375	177199	2.5	73	High Street (minor road)	31	30	31	28	31
London Harlington	Airport/Roadside	508295	177799	3	6.9	Sipson Lane (relatively minor)	33	38	36	30	35
Hillingdon Sipson	Urban Background	507328	177289	1.7	87	Sipson Way (Minor)	35	36	37	34	36



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Site name	Type	OS Coordinates		Height (m)	Distance to kerb (m)	Road	Annual mean NO ₂ concentrations (µg/m ³)				
		X (m)	Y (m)				2012	2013	2014	2015	2016
HS7 - Hatton Cross	Urban Background	509336	174999	2.5	87	Great South West Road (A30)	32	37	30	29	32
Hillingdon Harmondsworth	Roadside	505563	177660	1.7	1	Moor Lane (very minor)	32	30	30	28	27
Hillingdon Hayes	Roadside	510305	178887	1.7	1.1	North Hyde Road	46	47	53	47	47
Slough Colnbrook	Urban Background	503536	176825	2.9	155	Bath Road	29	30	30	28	29



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Table 5.5 Automatic air quality monitoring station details and measured annual mean PM₁₀ concentrations (µg/m³)

Site name	Type	OS Coordinates		Height (m)	Distance to kerb (m)	Road	Annual mean PM ₁₀ concentrations (µg/m ³)				
		X (m)	Y (m)				2012	2013	2014	2015	2016
LHR2	Airport	508392	176743	3	12.5	Northern Perimeter Road	24	26	19	13	15
Heathrow Oaks Road	Urban Background	505737	174496	3	4	Oaks Road (minor road)	20	22	18	14	15
Heathrow Green Gates	Airport	505184	176922	3	13	Bath Road	19	21	17	14	14
Hillingdon Oxford Avenue	Roadside	509554	176977	1.7	21	Bath Road (A4)	21	21	22	21	22
HS2 - Cranford	Background	510375	177199	2.5	73	High Street (minor road)	no data	19	20	18	18
London Harlington	Airport/Roadside	508295	177799	3	6.9	Sipson Lane (relatively minor)	18	20	20	16	15
HS7 - Hatton Cross	Urban Background	509336	174999	2.5	87	Great South West Road (A30)	20	no data	21	20	20



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Site name	Type	OS Coordinates		Height (m)	Distance to kerb (m)	Road	Annual mean PM ₁₀ concentrations (µg/m ³)				
		X (m)	Y (m)				2012	2013	2014	2015	2016
Hillingdon Harmonds worth	Roadside	505563	177660	1.7	1	Moor Lane (very minor)	no data	22	21	22	23
Hillingdon Hayes	Roadside	510305	178887	1.7	1.1	North Hyde Road	25	29	34	28	28
Slough Colnbrook	Urban Background	503536	176825	2.9	155	Bath Road	20	19	19	18	19

Table 5.6 Automatic air quality monitoring station details and measured annual mean PM_{2.5} concentrations (µg/m³)

Site name	Type	OS Coordinates		Height (m)	Distance to kerb (m)	Road	Annual mean PM _{2.5} concentrations (µg/m ³)				
		X (m)	Y (m)				2012	2013	2014	2015	2016
LHR2	Airport	508392	176743	3	12.5	Northern Perimeter Road	11	11	9	9	9
Heathrow Oaks Road	Urban Background	505737	174496	3	4	Oaks Road (minor road)	10	10	10	9	9
Heathrow Green Gates	Airport	505184	176922	3	13	Bath Road	10	10	10	9	9
London Harlington	Airport/Roadside	508295	177799	3	6.9	Sipson Lane (relatively minor)	13	14	14	10	10



UK Government assessment of compliance with EU limit values

- 5.6.16 The impacts of the DCO Project will be considered in the context of EU limit value compliance and therefore, existing baseline and future baseline projections at key road links within the PCM model will be relevant to the air quality assessment.
- 5.6.17 In the *UK plan for tackling roadside nitrogen dioxide concentrations*²⁶, NO₂ concentrations were modelled for all years from 2017 to 2030 using the PCM model for several different future scenarios to consider the measures required to achieve compliance²⁷. Modelled NO₂ concentrations for selected future years are shown in Table 5.7 to illustrate how NO₂ concentrations are predicted to decline in future as a result of renewal of road vehicles. Key PCM assessment locations, around Heathrow, and where compliance is predicted to be achieved latest, are shown in Figure 5.2.
- 5.6.18 Modelling included a 'baseline scenario' of measures already proposed, a 'Clean Air Zone (CAZ) scenario' with road traffic emissions controls being implemented in a variety of locations and the 'CAZ plus additional measures scenario', where the need for further action was identified in certain locations. Under these modelled scenarios, assuming implementation of the proposed CAZ measures (concentrations are the same in the CAZ plus additional measures scenario), compliance with the annual mean NO₂ EU limit value in the Heathrow area is predicted before 2025 (the last link in the Heathrow area that will be compliant is 18727, A312 North of the M4). Compliance with the EU limit value in Greater London is predicted in 2025 in the CAZ plus additional measures (including Central London Zero Emission Zone) scenario.

Table 5.7 PCM modelled NO₂ concentrations (µg/m³)

ID	Road	OS Coordinates		Annual mean roadside NO ₂ concentration (µg/m ³)							
		X	Y	CAZ scenario				CAZ plus additional measures scenario			
				2015	2020	2025	2030	2015	2020	2025	2030
70181	A40	526950	181700	97	66	41	35	97	66	39	33
16110	A4	523300	178400	104	66	39	34	104	66	39	34
74536	A40	523485	181110	95	64	39	33	95	64	39	33
74538	A40	523100	181060	95	64	39	33	95	64	39	33
74537	A40	523250	181080	95	64	39	33	95	64	39	33
47245	A501	529004	182226	93	61	39	34	93	61	39	34
26429	A501	527600	181860	96	62	39	34	96	62	39	34
48251	A501	527270	181770	89	60	38	33	89	60	38	33



ID	Road	OS Coordinates		Annual mean roadside NO ₂ concentration (µg/m ³)							
		X	Y	CAZ scenario				CAZ plus additional measures scenario			
				2015	2020	2025	2030	2015	2020	2025	2030
74535	A40	524200	181350	84	59	38	33	84	59	38	33
27236	A501	528000	182004	88	58	36	32	88	58	36	32
57537	A501	527862	181939	82	55	35	31	82	55	35	31
58173	A404	526760	181690	74	52	35	30	74	52	35	30
18727	A312 North of M4	510485	178535	63	50	35	29	63	50	35	29
16112	A4 Bath Road	508000	176940	49	40	35	34	49	40	35	34
26914	A312 South of M4	510400	178000	59	47	34	28	59	47	34	28
36309	Great South West Road	510000	175530	50	42	31	26	50	42	31	26
18487	M4 East of A437	510401	178265	45	38	29	24	45	38	29	24
6013	M4 East of Spur	508900	178400	44	38	29	24	44	38	29	24
36013	M4 Spur	507470	177800	41	35	28	24	41	35	28	24
36121	A4 Bath Road East	510000	177000	41	34	24	22	41	34	24	22

Dust deposition

- 5.6.19 Ambient dust deposition rates are not monitored extensively in the UK. Monitoring that is undertaken is usually connected with specific activities such as mining and mineral extraction operations or specific large-scale construction programmes. Dust monitoring may also be undertaken to investigate specific complaints



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received by local authorities, who are then required to investigate dust nuisance under the Environmental Protection Act 1990.

- 5.6.20 Dust deposition rates are not currently monitored in the Heathrow area. Current dust levels in the areas potentially affected by the DCO Project are expected to be well below annoyance levels due to the nature of land uses in the area and lack of likely emission sources. Monitoring of baseline PM and dust deposition levels will be undertaken in advance of commencement of the construction programme.

Odour

- 5.6.21 Similar to dust deposition rates, odour levels are not routinely monitored in the UK. Baseline odour surveys will be undertaken in advance of commencement of the construction programme and the assessment will be informed by data on any complaints received in relation to existing airport activities.

5.7 Likely significant effects requiring assessment

- 5.7.1 The air quality assessment will focus on the local air pollutants which have been subject to exceedances of either the AQOs or EU limit values. These are NO₂ and PM. Emissions of dust and odour, which can affect amenity, will also be considered. The likely effects requiring assessment are detailed in Table 5.8. For this topic, potential receptors have been identified through reviewing baseline data collected by other topics. The effects which are considered not to require assessment, and are proposed to be scoped out, are set out in Table 5.9.
- 5.7.2 Ecological receptors can be sensitive to deposition of pollutants, particularly nitrogen and sulphur compounds, which can affect the character of the habitat through eutrophication (nutrient enrichment) and acidification. Eutrophication derives from the deposition of nitrogen, whilst acidification is the result of nitrogen and sulphur compounds forming acid solutions which result in a loss of nutrients. As sulphur emissions within the study area, and adjacent to the road network, are very low it is proposed that only nitrogen deposition is considered. The approach to modelling deposition is detailed in **Appendix 5.1: Dispersion modelling methodology**. The assessment of effects of increased emissions of nitrogen compounds to air during the construction and operation phases on biodiversity are discussed in **Chapter 6: Biodiversity**.



Table 5.8 Likely significant air quality and odour effects

Activity	Effect	Receptor
Construction		
Land preparation (including excavation and earthworks)	Emission of dust causing loss of amenity at sensitive receptors near to work sites and haul roads	Residential properties, schools, medical facilities, commercial sites
	Emission of odours causing loss of amenity at sensitive receptors near to work sites	Residential properties, schools, medical facilities, commercial sites
Construction site (including laydown areas, staff facilities etc.), earthworks, runway and terminal/satellite development	Emission of dust causing loss of amenity at sensitive receptors near to work sites and haul roads	Residential properties, schools, medical facilities, commercial sites
	Emissions from construction vehicles and plant through fuel combustion that could increase concentrations of pollutants that could affect human health (NO ₂ and PM)	Residential properties, schools, medical facilities
Construction vehicle movements using the public highway or temporary construction haul roads.	Emissions from construction vehicles through fuel combustion and brake/tyre wear that could increase concentrations of pollutants that could affect human health (NO ₂ and PM) near to construction traffic routes	Residential properties, schools, medical facilities
Operation		
Aircraft movements on the new runway and taxiways	Increased emission from aircraft through fuel combustion that could increase concentrations of pollutants that could affect human health (NO ₂ and PM)	Residential properties, schools, medical facilities
	Increased emissions of odour from aircraft fuel, aircraft operation and airfield activity causing loss of amenity at sensitive receptors	Residential properties, schools, medical facilities, commercial sites
Land based activities in support of airport operation (including presence of workforce, use of vehicles and Ground Support Equipment, management of waste etc.)	Increased combustion emissions from as a result of increased air traffic movements that could increase concentrations of pollutants that could affect human health (NO ₂ and PM)	Residential properties, schools, medical facilities



Activity	Effect	Receptor
Vehicular traffic associated with the Airport (including airport staff and passengers and freight vehicles)	Increased emissions from vehicles on public highways that could increase concentrations of pollutants that could affect human health (NO ₂ and PM) at receptors near to roads	Increased concentrations of air pollutants that could affect Residential properties, schools, medical facilities

5.8 Effects not requiring assessment

5.8.1 The effects proposed to be scoped out of the air quality and odour assessment are displayed in Table 5.9.

Table 5.9 Effects to be scoped out of the air quality and odour assessment

Activity	Effect	Receptor	Justification for scoping out
Activities involving combustion (including aircraft movements on the new runway and taxiways, land based activities in support of airport operation and road traffic)	Increased emissions of other pollutants with AQOs, those subject to the Air Quality Standards Regulations 2010 and those included in The National Emission Ceilings Regulations 2018 that could affect human health at sensitive receptors (CO, SO ₂ , lead, benzene and 1,3 butadiene, arsenic, cadmium, nickel, mercury, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene,	Residential properties, schools, medical facilities	The revised draft ANPS ¹ states that the environmental statement should assess existing air quality levels for all relevant pollutants referred to in the Air Quality Standards Regulations 2010 and the National Emission Ceilings Regulations 2002 (as amended) or referred to in any successor regulations (paragraph 5.32). Having regard to this, it is proposed that all pollutants that could affect human health, other than NO ₂ , PM ₁₀ and PM _{2.5} , are scoped out of the assessment, as they have been in other airport air quality assessments around airports ^{35,36,37} . This is on the basis of current concentrations and in accordance with best practice as detailed in Project for the Sustainable Development of Heathrow (PSDH) ³⁸ (See: <i>Key Issues and Findings, What are the pollutants of concern for all Panels?</i>). Concentrations of CO, SO ₂ and benzene well below the relevant AQOs, as confirmed in Local Planning Authority LAQM reports. The London

³⁵ BAA Stansted, Generation 1 Environmental Statement Volume 3 Air Quality, April 2006

³⁶ BAA, Proposed Development at Stansted Airport Volume 10 Air Quality, August 2001

³⁷ Pratt M S, Compilation of Individual Case Results from the updated Modelling (at Terminal 5) BAA/821 Entec, 1998

³⁸ Department for Transport, Project for the Sustainable Development of Heathrow. Report of the Airport Air Quality Technical Panels, 2006

<http://webarchive.nationalarchives.gov.uk/20100513113102/http://www.dft.gov.uk/pgr/aviation/environmentalissues/heathrowsustain/>



Activity	Effect	Receptor	Justification for scoping out
	indeno(1,2,3-cd)pyrene, dioxins/furans, PCBs, HCB).		<p>Borough of Hillingdon does not consider that concentrations of these pollutants are high enough to warrant assessment or monitoring³⁹. It is recognised that the objectives for Benzene, 1,3-Butadiene, CO and Lead have been met for several years and concentrations are well below limit values, and as such local authorities in England do not have to report on these pollutants⁴⁰.</p> <p>Concentrations of heavy metals (arsenic, cadmium, nickel, mercury), Polycyclic Aromatic Hydrocarbons (benzo(a)pyrene and other polycyclic aromatic hydrocarbons) and Toxic Organic Micro-Pollutants (TOMPs – including dioxins, furans, polychlorinated biphenyls (PCBs) and Hexachlorobenzene) are monitored by Defra in relation to specific industrial sources and activities and to determine background concentrations^{41 42 43}. Concentrations of these pollutants are not monitored currently in the Heathrow area and have not been monitored historically in the area as no local activities or industrial sites have been identified that would lead to concentrations being above the relevant thresholds.</p>
Activities involving combustion (including aircraft movements on the new runway and taxiways, land based activities in support of airport operation and road traffic)	Exposure to O ₃ which could affect human health at sensitive receptors	Residential properties, schools, medical facilities	<p>O₃ is not emitted directly from any source in significant quantities, but is produced by reactions between other pollutants in the presence of sunlight (It is a 'secondary pollutant'). O₃ can travel long distances and reach high concentrations far away from the original pollutant sources⁴⁴. Local emissions associated with expansion are therefore unlikely to significantly alter background O₃ concentrations.</p> <p>Whilst O₃ concentrations will be considered in relation to the formation of NO₂ (from the emissions of NO_x, which include nitric oxide (NO) that is converted in reaction with O₃ to</p>

³⁹ London Borough of Hillingdon, Air Quality Action Plan, Updating and Screening Assessment, 2015

⁴⁰ Defra, Local Air Quality Management Technical Guidance (TG16), February 2018 version

⁴¹ Defra, Heavy Metals Network, 2018 –

<https://uk-air.defra.gov.uk/networks/network-info?view=metals> (accessed 02 May 2018)

⁴² Defra, Automatic Hydrocarbon Network, 2018 –

<https://uk-air.defra.gov.uk/networks/network-info?view=hc> (accessed 02 May 2018)

⁴³ Defra, Toxic Organic Micro Pollutants (TOMPs) Networks, 2018 –

<https://uk-air.defra.gov.uk/networks/network-info?view=tomps> (accessed 02 May 2018)

⁴⁴ Defra, Air Pollution in the UK 2015, 2016



Activity	Effect	Receptor	Justification for scoping out
			<p>NO₂), specific assessment of O₃ concentrations is proposed to be scoped out, in accordance with best practice as detailed in PSDH, in which it was stated that (See: <i>Key Issues and Findings, What are the pollutants of concern for all Panels?</i>):</p> <p><i>“While ozone information is important for atmospheric chemistry effects in dispersion modelling, the technical Panels did not consider a priority area to be modelling the impact of Heathrow emissions on ozone concentrations.”</i></p>
<p>Activities involving combustion (including aircraft movements on the new runway and taxiways, land based activities in support of airport operation and road traffic)</p>	<p>Increased emissions of pollutants that form secondary PM within the atmosphere as a result of chemical reactions, which could affect human health at sensitive receptors</p>	<p>Residential properties, schools, medical facilities</p>	<p>The rate of formation of secondary PM is relatively slow, of the matter of hours, and in close proximity to the emission source the primary PM component would dominate concentrations at sensitive receptors. Further from the emission source, the contribution from airport-related emissions relative to background secondary PM and other primary emissions would be expected to negligible.</p>
<p>Jettisoning of fuel from aircraft in flight</p>	<p>Increased emission of aviation fuel odours causing loss of amenity at sensitive receptors under flight paths</p>	<p>Residential properties, schools, medical facilities</p>	<p>Pilots of aircraft in flight are permitted to jettison fuel in an emergency. When this happens, the flight crew is required to co-ordinate with Air Traffic Control (ATC) regarding the route to be flown (which, if possible, should be clear of cities and towns), the level to be used and the estimated duration of the fuel jettison. The Manual of Air Traffic Services provides details on the limited circumstances in which this can be carried out⁴⁵. Controllers are required to recommend to flight crew that jettisoning of fuel should be carried out above 10,000 feet. Exceptionally, if fuel dumping at this level, or over water, is operationally impracticable or inconsistent with safety, fuel may be jettisoned above 7,000 feet in winter and above 4,000 feet in summer. For fuel to be jettisoned below these levels the situation must be unavoidable.</p> <p>As jettisoned fuel evaporates completely before reaching ground, and the upper limit of the Planetary Boundary Layer (PBL) at the altitude of approximately 3,000 feet over ground renders the air flow from the upper to the lower layers of the atmosphere more difficult, the chance of fuel</p>

⁴⁵ Civil Aviation Authority, Manual of Air Traffic Services – Part 1 CAP 493, 2015



Activity	Effect	Receptor	Justification for scoping out
			reaching the ground is unlikely ⁴⁶ . Furthermore, fuel jettison is not carried out as part of routine operations and is only carried out in emergencies. For these reasons it is proposed that this source is scoped out of the assessment.

5.9 Proposed approach to the assessment

- 5.9.1 The study areas are set out in Section 5.4. These will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed. Therefore, the study areas may evolve as appropriate.
- 5.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Additional baseline information required

- 5.9.3 As described in Section 5.4: Study area, should the study area change in response to the evolving design, the need for any additional baseline data for air quality and odour may be reviewed and updated.
- 5.9.4 2016 air quality monitoring data has been collated in this Scoping Report. 2017 monitoring data will be collated during 2018 when data from automatic monitoring stations have been fully ratified and NO₂ diffusion tube results have been published by local authorities.
- 5.9.5 Heathrow has funded Slough Borough Council to install an automatic air quality monitoring station in the Brands Hill AQMA. It is anticipated that data from this monitoring station will be available later in 2018. In addition, as the A4, Bath Road is a road link considered in Defra PCM modelling, Heathrow is currently proposing to install an automatic air quality monitoring station on this road link, so that direct comparison between modelled PCM pollutant concentrations and measured concentrations can be made as the assessment proceeds.
- 5.9.6 Monitoring of baseline PM, dust deposition and odour levels will be undertaken in advance of commencement of the construction programme. Odour complaints data will also be collated and reviewed.

⁴⁶ Zurich Airport, Fuel Dumping, 2012



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Assessment years

- 5.9.7 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the air quality and odour assessment specifically.
- 5.9.8 NO₂ and PM concentrations are predicted to reduce in future years across the UK as older road vehicles are replaced by newer vehicles that comply with progressively tighter emissions standards. This will reduce both background pollutant concentrations and emissions on roads that directly affect pollutant concentrations. The worst-case year for air quality may not therefore coincide with the year of maximum ATMs or maximum road traffic flows, which could occur in later years, when pollutant concentrations are lower and impacts therefore have reduced significance.
- 5.9.9 The DCO Project would be implemented over a number of years and as such several assessment years will need to be considered in the air quality assessment. These are considered to be:
1. Current baseline – reflecting the ‘current’ baseline at the point of DCO submission. This is likely to be 2017, as the last complete full year of air quality monitoring data, traffic data and airport activity data when dispersion modelling takes place
 2. Release of first phase of capacity under the existing airport layout – where the number of ATMs is proposed to increase from 480,000 to up to 505,000 (the ‘early ATMs’)
 3. Year of maximum effects from construction activities – Likely to be year(s) of highest construction vehicle movements. This may also include the release of the first phase of additional ATM capacity
 4. Future baseline – multiple future baseline scenarios will be defined for both the construction and operational assessment elements and will assume no expansion (480,000 ATMs)
 5. Year of third runway opening – known as Year 1 of operation
 6. Year of maximum air quality effects – this is likely to be the year at which emissions are highest, and could therefore occur during the construction phase when emissions from construction and operation will have combined effects and background pollutant concentrations are higher than subsequent years
 7. Year of maximum ATM capacity (design year) and/or Project related road traffic flows



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8. Further assessment years may be modelled and reported, as required in relation to proposed phasing, in order to ensure that reasonable worst-case impacts are identified and assessed.

Construction assessment methodology

Demolition and construction dust

- 5.9.10 The GLA²² and the IAQM²⁴ have developed guidance regarding the assessment of the impacts of construction on air quality and the determination of their significance, which will be used to assess construction impacts.
- 5.9.11 Local communities can be concerned that development activities (particularly construction works) would result in regular and persistent dust emissions, which may affect local amenity and quality of life. The level of concern, and potential for annoyance, is related to the existing baseline dust levels, the number and proximity of residential areas to the site, and the exact nature of the activities on-site. The degree of actual annoyance would also depend on factors such as the rate of dust deposition, and the application of mitigation measures on site.
- 5.9.12 Dust complaints are usually associated with periods of peak deposition, occurring during particular weather conditions. There is a 'normal' level of dust deposition in every community and it is only when the rate of deposition is high relative to the norm that complaints tend to occur. The guidance sets out the factors influencing annoyance, which includes the effects of dust on a community. The risk of demolition and construction activities causing exceedance of PM₁₀ AQOs is also considered.
- 5.9.13 The GLA and IAQM guidance provide a method to assess the significance of construction effects by considering the annoyance due to dust soiling as well as harm to ecological receptors and the risk of health effects due to any significant increases to PM₁₀ or PM_{2.5}. Site activities are divided into four types to reflect their different potential effects:
1. Demolition – an activity involved with the removal of an existing structure or structures
 2. Earthworks – the processes of soil-stripping, ground-levelling, excavation and landscaping
 3. Construction – an activity involved in the provision of a new structure
 4. Vehicle movements – which can cause trackout (the transport of dust and dirt from the site onto the public road network). This arises when lorries leave site with dusty materials or transfer dust and dirt onto the road having travelled over muddy ground on-site.



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- 5.9.14 The construction dust assessment will be carried out for individual work sites. The number of receptors within different distance bands of site boundaries (to determine the sensitivity of the area) will be counted. The distance bands used to determine the number of receptors will be 20m, 50m, 100m and 350m.
- 5.9.15 Individual construction working sites will then be classified according to the risk of effects (based upon the scale and nature of the works, plus the proximity of sensitive receptors). Appropriate site-specific mitigation measures will then be identified.
- 5.9.16 The significance of the dust effects is generally assigned considering the embedded mitigation and identified site-specific mitigation. This would take account of the risk of effects, and other factors that might affect the risk of dust effects arising, even after any site-specific mitigation has been implemented. The overall significance of the effects arising from the entire construction phase of the Development is based on professional judgement, taking into account the significance of the effects of each of the four activity types.

Odour

- 5.9.17 Potential odour effects during the construction phase will be assessed in accordance with guidance produced by the IAQM regarding the assessment of odour for planning. The guidance includes a summary of predictive and observational/empirical assessment tools and assessment criteria. Assessment tools include the monitoring of odour in ambient air through “Sniff Tests” and passively using the community as the “sensor” via complaints analysis. Assessment will use the Source-Pathway-Receptor (S-P-R) concept and the significance of effects will be determined in relation to the level of odour exposure experienced by receptors and their sensitivity.

Construction vehicle and plant emissions

- 5.9.18 The impact of emissions from the additional road traffic vehicles during the construction phase will be assessed using the same methodology as described for the operational assessment, including the assessment of compliance with EU limit values.
- 5.9.19 Emissions from construction related Non-Road Mobile Machinery (NRMM) during the construction phase will also be incorporated into the dispersion modelling for the relevant years.



Operation assessment methodology

The role of dispersion modelling

- 5.9.20 Whilst it is possible to measure concentrations of pollutants of concern, and monitoring stations are operating in the area around Heathrow, air quality cannot be measured at every location, and measurements do not allow future concentrations to be estimated. Dispersion modelling is required to fill in the gaps between monitoring sites and is the only way to quantify likely significant effects in future years. The assessment of operational impacts will therefore be carried out using the Cambridge Environmental Research Consultants (CERC) ADMS-Airport (airport sources), ADMS-Roads (road traffic emissions) and ADMS-5 (stationary combustion sources) dispersion models. Dispersion modelling has the following benefits:
1. It can fill in the spatial gaps between monitors, allowing air quality to be assessed at all locations of interest
 2. It makes it possible to see which sources are responsible for pollution and for how much (“source apportionment”)
 3. It provides a basis for forecasting future air quality. Even in the case of ‘business as usual’, there will be changes in the number and types of aircraft using the airport, for example. In addition, where there are proposals for changes to airport infrastructure, such as a new runway, modelling is necessary to understand the likely effects of such developments.
- 5.9.21 The assessment will largely follow the recommendations of The DCO Project for the Sustainable Development of Heathrow (PSDH)³⁸, which is considered to be best practice in the assessment of air quality around airports. PSDH was set up by the Department for Transport in 2005 to investigate the environmental effects of a third runway at Heathrow. It convened a panel of experts in air quality, aircraft technology, airport operations and related fields to develop a best practice methodology for assessing the air quality impacts of a third runway at Heathrow.
- 5.9.22 The modelling process will have three key stages, which are detailed further in **Appendix 5.1**:
1. For each modelled scenario, an emissions inventory will be established to calculate how much pollution is emitted from the different sources, based on recorded activity levels and forecast future activity. In addition, a forecast will be made of the ‘background’ contribution in the assessment year (i.e. the contribution from all sources not modelled explicitly)



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2. Dispersion modelling will be used to calculate how the emissions are carried through the air, due to meteorological conditions such as wind speed and direction, and determine the concentrations of pollution in the air
3. These modelled concentrations will then be compared with the local monitoring data in the model verification process as a check on the accuracy of the model. The final total concentrations are also compared with the AQOs to see if there is a risk of them being exceeded.

5.9.23 Annual mean concentrations of NO_x, NO₂, PM₁₀ and PM_{2.5} will be predicted. Shorter-period concentrations, which feature in some EU limit values and AQOs, will be derived from annual mean values, using relationships that have been recommended in technical guidance for Local Planning Authority LAQM Review and Assessment⁴⁷.

5.9.24 Concentrations will be calculated on a fine spatial grid throughout the core assessment area. In addition to this grid of receptor points used for concentration contours, specific receptor points will be used to enable a more detailed examination of concentration changes at particular sensitive receptor locations. This set of receptors will include current monitoring sites close to the Airport and other off-airport locations with relevant public exposure. This will include all residential properties within the core assessment area. In addition, a number of ecological sites will be included as receptors in the modelling assessment.

Effect significance for in relation to Air Quality Objectives

5.9.25 It is proposed that the significance of effects on NO₂ and PM concentrations as determined through dispersion modelling will be assessed using the guidance contained in the Highways England Interim Advice Note 174/13 on *Evaluation of Significant Local Air Quality Effects*⁴⁸. It is recognised that further government guidance on the assessment of the environmental effects of major infrastructure projects may be published before the assessment is complete. In this case, the application of the most recent relevant guidance will be considered in the assessment.

5.9.26 The assessment of significance will be made on the basis of following key criteria in relation to human exposure discussed in the Interim Advice Note:

1. The risk that environmental standards will be breached
2. The probability of the effect occurring
3. Whether there will be a large change in environmental conditions

⁴⁷ Defra, Local Air Quality Management Technical Guidance (TG16), 2016

⁴⁸ Highways England, Interim Advice Note 174/13 Evaluation of Significant Local Air Quality Effects, 2013



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4. The duration of the effect
5. The number of people affected and
6. The potential for avoiding, or reducing or compensating for the effect.

5.9.27 The magnitude of change criteria for annual average NO₂ and PM₁₀ concentrations are shown in Table 5.10. It is noted that assessment such take account of the total pollutant concentrations. The higher above the air quality thresholds the changes are predicted to occur, the greater the significance of the change. Where the difference in concentrations is less than 1% of the air quality threshold (e.g. less than 0.4µg/m³ for annual average NO₂) then the change at these receptors is considered to be imperceptible and they can be scoped out of the judgement on significance. The overall assessment of significance is then related to the number of receptors predicted to experience a worsening or improvement in air quality and the predicted concentrations relative to the AQOs.

Table 5.10 Magnitude of change criteria

Magnitude of change in concentration	Value of change in annual average NO ₂ and PM ₁₀
Large (>4)	Greater than full Measure of Uncertainty (MoU) value of 10 % of the air quality objective (4µg/m ³).
Medium (>2 to 4)	Greater than half of the MoU (2µg/m ³), but less than the full MoU (4µg/m ³) of 10% of the air quality objective.
Small (>0.4 to 2)	More than 1% of objective (0.4µg/m ³) and less than half of the MoU i.e. 5% (2µg/m ³). The full MoU is 10% of the air quality objective (4µg/m ³).
Imperceptible (≤0.4)	Less than or equal to 1% of objective (0.4µg/m ³).

Assessment of compliance with EU limit values

- 5.9.28 Using the dispersion modelling approach described in this section, NO₂ concentrations will be predicted at key PCM assessment locations, around Heathrow, and where compliance with the NO₂ EU limit value is predicted to be achieved latest. These assessment locations are shown in Figure 5.2. Concentrations will be predicted under the future baseline scenario and the scenario with the development for each assessment year at each assessment location. This will enable the increment in NO₂ concentration predicted as a result of the development to be calculated.
- 5.9.29 The increment in NO₂ concentration resulting from the development will be added to the concentration predicted using the PCM model to determine a total NO₂ concentration which can be used to consider compliance. The total NO₂



concentration predicted in this way will be compared to the highest concentration predicted in the Greater London agglomeration for that assessment year, to consider the impact of the development on compliance. This approach is consistent with current Highways England guidance¹⁷ and the requirements of the NN NPS², in which it is stated that a scheme should be refused when the air quality impacts will:

“Result in a zone/agglomeration which is currently reported as being compliant with the Air Quality Directive becoming non-compliant; or

Affect the ability of a non-compliant area to achieve compliance within the most recent timescales reported to the European Commission at the time of the decision.”

Odour emissions and potential annoyance

- 5.9.30 There is limited published information regarding the odour potential of Volatile Organic Compound (VOC) emissions from aircraft engines that could potentially assist in the evaluation of potential odour annoyance. Odour perception and its potential to cause annoyance is also subjective and is strongly dependent on the nature of the odour and the sensitivity or tolerance of those exposed. Experience of the assessment team suggests that a dispersion modelling approach to assessing potential changes in VOC concentrations would not enable an evaluation of potential odour effects and significance.
- 5.9.31 As such, a semi-quantitative odour assessment will be undertaken and reported in accordance with IAQM guidance²⁴. This will consider the number and location of odour complaints received at Heathrow under the current layout and likely changes following expansion. The odour source (e.g. aircraft movements), the pathway for odour flux to receptor (e.g. distance and direction in relation to prevailing wind direction) and receptor sensitivity will be considered. The assessment will provide a qualitative assessment of likely changes to the number of complaints as a result of the DCO Project.

Air Quality Expert Review Group (AQERG)

- 5.9.32 The Heathrow Air Quality Expert Review Group (AQERG) has been established to provide a technical check and challenge of the approach to air quality assessment. This group will also provide an independent and expert perspective on reasonable and practicable means of controlling emissions and improving ambient air quality. The AQERG members represent several leading organisations in the field of air quality. They will provide inputs on a range of aspects, including road vehicle emissions, emissions from aviation activities and potential mitigation measures.
- 5.9.33 At the meetings carried out so far, the general approach to assessment and specific technical issues have been discussed. The approach detailed here has



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sought to reflect the discussions held with AQERG and the comments received at these meetings. The following meetings have been held (discussion topics in brackets):

1. Meeting 1 14/09/2017 (Current emissions management approach, introduction to expansion, previous air quality assessments, DCO approach, terms of reference)
2. Meeting 2 07/12/2017 (Consultation 1, Revised Draft Airports National Policy Statement, dispersion model verification)
3. Meeting 3 18/03/2018 (Consultation 1 feedback, further discussion on model verification, future road traffic fleet forecasts, EIA scoping including pollutants to be assessed, surface access strategy, potential emissions charging schemes)
4. Meeting 4 03/05/2018 (Review of scoping chapter, overview of current construction strategy, approach to assessment of construction impacts, discussion of incorporation of regional background pollutant contributions).

Cumulative effects

- 5.9.34 Cumulative air quality and odour effects resulting from the combination of effects from the DCO Project and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

5.10 Approach to mitigation

Construction phase

Draft Code of Construction Practice

- 5.10.1 A draft Code of Construction Practice (CoCP) will be produced, setting out a series of proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, management and control during construction, to mitigate potential impacts upon people, businesses and the natural and historic environment.
- 5.10.2 The draft CoCP will set out measures for the effective management of potential construction impacts on the local population, businesses, natural environment and airport operations. The draft CoCP will also outline the envisaged logistics measures, based on best practice construction methodologies, site management and effective vehicle and workforce management, supported by the delivery of temporary infrastructure (for example rail facilities or car parking) and systems (such as delivery management and security) both on and off site.



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- 5.10.3 The draft CoCP will build upon and incorporate the mitigation measures for the construction stage are suggested in the revised draft ANPS. These are:
1. Development of a construction traffic management plan (which may include the possible use of rail and consolidation sites or waterways)
 2. The use of low emission construction plant / fleet, fitting of diesel particulate filters, and use of cleaner engines
 3. The use of freight consolidation sites
 4. Active workforce management / a worker transport scheme
 5. Construction site connection to grid electricity to avoid use of mobile generation
 6. Selection of construction material to minimise distance of transport and increase recycling percentages of the material where appropriate.

Construction logistics hubs

- 5.10.4 It is proposed that construction logistics hubs will be used to pre-assemble components of the expanded airport before transporting them in consolidated loads to Heathrow. The logistics hubs would therefore play a key role in reducing potential emissions from construction vehicles by transporting assembled components to site in fewer lorries.

Transport of material by rail

- 5.10.5 As part of the planning of the construction phase, opportunities are being investigated to maximise the transport of bulk construction materials, such as earthworks fill or aggregate for reinforced concrete, by rail rather than by road. This could reduce construction traffic and associated vehicle emissions. This would require the development of a rail terminal, which could potentially be located to the north of the new runway along the Colnbrook branch line. The rail terminal may also include concrete and asphalt batching plants with sufficient material stockpiled to ensure continuous production, as required.

Traffic management

- 5.10.6 Movement of construction freight by road would be managed using a Delivery Management System that allocates pre-booked delivery slots allowing the time of each delivery to be controlled, managing the flow of heavy goods vehicles (HGVs) arriving at the site entrances, spreading the deliveries through the day and avoiding the peaks where possible. The option of creating a freight parking area near the site, to act as a buffer for parking and holding HGVs when required, is also being investigated.



- 5.10.7 The routing of construction traffic will be carefully planned to ensure that, where practicable, construction vehicles are routed away from areas that are more sensitive to changes in air quality and local communities.
- 5.10.8 The expansion of Heathrow would require a considerable workforce especially during peak construction periods. Opportunities are being investigated to reduce the number of workers on site by increasing off site manufacturing and pre-fabrication and improving on-site construction methods.
- 5.10.9 The majority of the construction workforce would travel to site each day by public and sustainable transport modes. Existing bus routes could be supplemented by the DCO Project to preserve capacity for other passengers. Where a route terminates at the Central Terminal Area (CTA), internal bus services could transport the workforce from the CTA to their work location. Workforce Travel Plans will be developed to encourage the use of the public transport and sustainable modes of transport.
- 5.10.10 For the minority of workers driving to site, car parking will be provided near the site and a shuttle bus service will transport workers to their site offices or workplaces. The parking facilities would be located in strategic locations near the major access routes to Heathrow.

Potential operational strategies

Revised draft ANPS

- 5.10.11 The development design and proposed operational protocols are being developed in line with the following mitigation measures suggested in the revised draft ANPS:
1. Landing charges structured to reward airlines for operating cleaner flights (for example NOx emissions charging)
 2. Zero- or low-emission hybrid or electric vehicle use (ultra-low emission vehicles), charging and fuel facilities
 3. Reduced or single engine taxiing (improved taxiing efficiency)
 4. Reducing emissions from aircraft at the gate (for example installation of fixed electrical ground power and preconditioned air to aircraft stands to reduce the use of auxiliary power unit)
 5. Modernised heating supplies in airport buildings
 6. Changes to the layout of surface access arrangements
 7. Traffic restrictions and / or traffic relocation around sensitive areas
 8. An emissions-based access charge



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9. Physical means, including barriers to trap or better disperse emissions and speed control on roads.

Meeting surface access targets and commitments

- 5.10.12 Heathrow is developing a surface access strategy to meet targets set out in the revised draft ANPS on public transport mode share (at least 50% of surface access passengers arriving or departing from Heathrow by public transport in 2030 and at least 55% of surface access passengers arriving or departing from Heathrow by public transport in 2040), colleague car use reduction (25% reduction of all colleague car trips by 2030 compared with 2013 levels and 50% reduction of all colleague car trips by 2040 compared with 2013 levels) and the commitment to no increase in Heathrow-related traffic.
- 5.10.13 Heathrow has identified eight key initiatives that will drive the development of the surface access strategy. These initiatives are grouped into two areas:
1. Initiatives that improve the physical infrastructure and the level of service provided to passengers, colleagues and local residents
 2. Initiatives that make public transport easier to use and change travel behaviour more widely.
- 5.10.14 The proposed initiatives deliberately overlap and will inform the development surface access strategy for the airport. The eight key initiatives are:
1. Putting Heathrow at the heart of the rail network
 2. Creating a public transport focused airport
 3. Providing a resilient and reliable road network
 4. Investing in local transport solutions
 5. Strengthening the coach hub at Heathrow
 6. Making public transport easier to use
 7. Enabling more efficient and responsible use of the road
 8. Building on the success of our Commuter Programme.
- 5.10.15 Further details can be found in **Chapter 17: Traffic and transport**.

Reducing emissions through vehicle charging

- 5.10.16 As older vehicles with higher emissions are replaced by newer ones that meet progressively tighter EU emission standards, air quality is predicted to improve. To accelerate this process, Heathrow is exploring the potential for strategically managed access charges, low emission zones, and parking charges at Heathrow



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to further encourage the use of low emissions vehicles, reduce unnecessary highway travel, and generate revenue to invest in public transport.

- 5.10.17 It is envisaged that the focus in the early years would be on tackling the existing issues around air quality, encouraging those who drive to the airport to do so in the cleanest possible vehicles. In later years, and as the numbers of passengers increases with expansion, it is likely that there would be a growing emphasis on discouraging unnecessary highway travel and encouraging as many people as possible to use public transport or walk or cycle where these are viable alternatives.

Incentivising cleaner aircraft and operations

- 5.10.18 Heathrow discourages the use of the aircraft with the highest emissions through landing charges. As technology develops, even more stringent emission standards can be expected for aircraft and the incentive framework will be developed to ensure that the cleanest available aircraft are used at Heathrow.
- 5.10.19 Airport Collaborative Decision Making (A-CDM) will also be used to improve the overall efficiency of airport operations by optimising the use of resources and improving the predictability of events. This will help to reduce congestion through the focus on aircraft turn-round and pre-departure sequencing processes.

Design development

- 5.10.20 The DCO Project will be designed in accordance with the latest best practice in airport design, and will incorporate all the features and processes that have been developed over recent years to reduce emissions.

Efficient airfield design

- 5.10.21 The third runway will be located as close to the existing northern runway as operationally possible. The minimum separation distance of the new runway from the existing runway to achieve safe independent operations is 1,035m. Locating the new runway as far south as possible will reduce the potential for aircraft and road traffic emissions to have combined effects on properties located to the north of the M4 motorway.
- 5.10.22 The layout of aircraft taxi paths will be optimised to reduce air quality impacts by ensuring aircraft movements on the ground are highly efficient and engine use is reduced. This can be achieved by keeping distances between runways, taxiways, aprons and stands to a practicable and safe minimum and therefore reducing the distance that aircraft travel when not in flight.



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- 5.10.23 The positioning of taxiways will also consider the proximity of people, such as residential properties to the north of the A4 Bath Road, and sufficient separation will be maintained between these receptors and taxiing aircraft.

Road diversions and layout

- 5.10.24 When evaluating potential diversions to the existing road network in the Heathrow area and the positioning and scale of new highway infrastructure, a number of high level principles have been applied. The evaluation criteria for air quality have been developed so that options which provide greater separation between proposed road infrastructure and locations where people could be exposed to associated vehicle emissions are preferred. Additionally, when identifying preferred options, the likelihood of increases in traffic on existing roads, increasing people's exposure to pollutants, has been considered.

Southern Access Road Tunnel

- 5.10.25 Another intervention under consideration is a new Southern Access Road Tunnel, linking the Southern Perimeter Road with the Central Terminal Area via a new underground road beneath the southern runway. This could provide flexible access options, helping to reduce travel distances and traffic volumes on parts of the strategic road network, and therefore contributing to the management of emissions from vehicles accessing the airport. The Southern Perimeter Road would provide the main landside connection for vehicles and existing junctions would be upgraded where necessary to accommodate the changes in traffic flows.
- 5.10.26 A Southern Access Road Tunnel could reduce road based journey distance to the CTA from the south and west by about five miles, reducing vehicle mileage and potentially helping to contribute to a reduction in emissions to the north west and east of the Airport.
- 5.10.27 It could also reduce journey times for public transport, supporting the creation of more direct and reliable bus routes for Heathrow and the surrounding area. In addition it could create new and more viable opportunities for active travel from the south of Heathrow such as cycling to and from the Airport through the tunnel to the central terminal area.

Land-use planning

- 5.10.28 During the design development process, the impacts of a wide variety of land-uses on air quality are being considered in relation to the sensitivity of the local area. This process seeks to reduce the risk of uses with the potential to generate additional traffic, affecting areas particularly sensitive to changes in air quality, i.e. roads where high pollutant concentrations have been recorded at receptor locations. Similarly, this process will be used to ensure, where practicable, that



activities that could generate emissions with a nuisance value (e.g. odour) are not located close to residential areas.

Parking

- 5.10.29 The DCO Project provides an opportunity to consolidate existing parking capacity adjacent to the primary access routes to the Airport and provide onward transport to the terminal areas via sustainable modes.
- 5.10.30 At Heathrow today, there are approximately 39,000 Heathrow controlled on-airport car parking spaces for passengers and colleagues. There are a further 12,500 spaces that are under the control of other tenants around the Airport including British Airways.
- 5.10.31 With expansion, it is proposed to keep the number of spaces at a similar level to today and to manage the parking that is available in a way that helps achieve the wider priorities for surface access and therefore manage associated emissions.
- 5.10.32 The proposed approach is based on the following:
1. Consolidation of parking for passengers: clusters of car parks will be grouped together with good access to the road network and direct links to airport terminals. This would help reduce the amount of traffic circulating around the airport reducing emissions and pollutant concentrations adjacent to these road links
 2. Reduction and consolidation of colleague parking: the amount of parking available for colleagues will reduce with parking for colleagues managed in a more integrated way and priority given to those colleagues who cannot realistically travel to work by public transport or who are prepared to car share
 3. Smart and clean parking: technology has a role to play in ensuring that car parks operate efficiently, which could also include a form of emissions based pricing for access to car parks, with cleaner, less polluting vehicles paying less and having better access to terminals.

Freight facilities

- 5.10.33 In the future, Heathrow seek to double freight handling capacity, but minimise the number of individual freight journeys on the road network surrounding Heathrow, therefore limiting their contribution to pollutant concentrations. This could be achieved through:
1. Adherence to designated routes – These routes will be discussed and agreed with the relevant highway authorities and take into consideration local air quality



2. Use of holding areas and vehicle call off areas – A commitment to using holding and call off areas allowing vehicles to wait at suitable locations where they can be called to site when appropriate and at short notice, which can help to reduce circulating movements, congestion and therefore vehicle emissions
 3. Use of consolidation centres – The provision of an off-airport consolidation centre could reduce the number of individual vehicle movements to the local warehouses and could therefore cut the number of road miles, fuel costs and vehicle emissions
 4. Freight by rail – Facilities used for the construction phase could be used in the operational phase for rail freight, thereby reducing the number of freight vehicles on the roads associated with Heathrow and helping to improve air quality.
- 5.10.34 Various measures have also been identified to influence freight vehicles and delivery behaviour in order to reduce the potential impact of Heathrow related freight vehicles on traffic and air quality, including: safety and environmental standards; cleaner vehicle standards; an increase in load factors; delivery scheduling and re-timing for out-of-peak or out-of-hours deliveries; collaboration between businesses on-site; and, smart procurement to manage deliveries.



Chapter 6

Biodiversity



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6. BIODIVERSITY

6.1 Introduction

6.1.1 This chapter describes the scope of the assessment as it relates to terrestrial and freshwater biodiversity. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.

6.1.2 This chapter describes:

1. The biodiversity policy and legislative context
2. Topic specific stakeholder engagement so far and future proposed engagement
3. The study area for the assessment
4. Sources of data used for scoping
5. Baseline conditions, including current desk studies and surveys
6. Likely significant effects of the DCO Project on biodiversity
7. Effects not requiring assessment
8. The proposed approach to the assessment
9. Approach to mitigation and compensation.

6.2 Policy and legislation

6.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 6: Biodiversity**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.

6.2.2 The policy and legislation relevant to biodiversity is detailed in Table 6.1.

Table 6.1 Policy and legislation relevant to biodiversity assessment

Relevant policy / legislation	Relevance to the assessment
Policy – National	
Revised draft Airports	This document sets out the national policies on biodiversity and conservation of most relevant to airport expansion.



Relevant policy / legislation	Relevance to the assessment
<p>National Policy Statement¹</p>	<p>The “Biodiversity and Ecological Conservation” section summarises the UK Governments’ biodiversity strategy at paragraph 5.84. The aim the strategy “<i>is to halt overall biodiversity loss, support healthy, well-functioning ecosystems, and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.</i>” This strategy is followed through this document by reference to the National Planning Policy Framework (NPPF) which supports a movement from net loss of biodiversity, through to an interim stage of no net loss to achieving net gains for nature (paragraph 5.85).</p> <p>Paragraph 5.88 recommends that the Environmental Statement (ES) submitted with an application for development consent should clearly set out any likely significant effects on internationally, nationally and locally designated sites of ecological importance, protected species and habitats and other species identified as being of principal importance for the conservation of biodiversity. Paragraph 5.89 requires the principles of “Biodiversity 2020” A strategy for England’s wildlife and ecosystem services” to be reflected in the assessment (see below) and include consideration of climate change and the functioning of ecological networks.</p> <p>Paragraphs 5.90 to 5.94 describe the need for the opportunities to conserve biodiversity to be maximized, within the context of the mitigation hierarchy, accounted for using either a compensation ratio or a biodiversity offsetting metric (refer to Section 6.10: Approach to mitigation).</p>
<p>National Policy Statement for National Networks²</p>	<p>The “Biodiversity and Ecological Conservation” section summaries the UK Governments’ biodiversity strategy at paragraph 5.20 with reference to the Natural Environment White Paper. The strategy is summarised as “<i>a vision of moving progressively from net biodiversity loss to net gain, by supporting healthy, well-functioning ecosystems and establishing more coherent ecological networks that are more resilient to current and future pressures.</i>”</p> <p>The Applicant is directed to (at paragraphs 5.22 and 5.23):</p> <p>“<i>...ensure that the environmental statement clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity and that the statement considers the full range of potential impacts on ecosystems.</i>”</p> <p>and</p> <p>“<i>...show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests.</i>”</p>

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017

² Department for Transport, National Policy Statement for National Networks, 2014



Relevant policy / legislation	Relevance to the assessment
<p>National Planning Policy Framework (NPPF)³</p>	<p>Sets out planning policy for England. Section 11 Conserving and Enhancing the Natural Environment the overarching approach of the UK Government is outlined. Paragraph 109 states:</p> <p><i>“The planning system should contribute to and enhance the natural and local environment by:</i></p> <ul style="list-style-type: none"> • <i>protecting and enhancing valued landscapes, geological conservation interests and soils;</i> • <i>recognising the wider benefits of ecosystem services;</i> • <i>minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government’s commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;</i> • <i>preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability; and</i> • <i>remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.”</i> <p>It states (at paragraph 118) that planning decisions should apply the principle of the mitigation hierarchy, seek to avoid development within Sites of Special Scientific Interest (SSSI) and Ancient Woodlands unless the benefits of the development clearly outweigh the predicted impacts and encourage the incorporation of biodiversity in and around developments.</p> <p>A draft revised NPPF⁴ is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard.</p>
<p>Legislation – National</p>	
<p>Conservation of Habitats and Species Regulations 2017</p>	<p>These regulations transpose the Habitats Directive⁵ in to national legislation.</p> <p>The regulations provide for the designation and protection of European sites, the protection of certain species (referred to as European Protected Species or EPS) and the adaptation of planning and other controls for the protection of European sites.</p>
<p>Wildlife & Countryside Act</p>	<p>This act consolidates and amends existing national legislation to implement the Bern Convention⁶ and the Birds Directive⁷.</p>

³ Department for Communities & Local Government, National Planning Policy Framework, 2012

⁴ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018

⁵ Council Directive 92/43/EEC on the Conservation of natural habitats and wild flora and fauna, May 1992

⁶ The Convention on the Conservation of European Wildlife and Natural Habitats, 1982

⁷ Council Directive 2009/147/EC on the conservation of wild birds (codified version), November 2009



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Relevant policy / legislation	Relevance to the assessment
1981 (as amended)	The legislation (amongst other things) provides protection to a range of species of flora and fauna and details the law relating to Sites of Special Scientific Interest (SSSI).
Countryside & Rights of Way Act 2000	This act details further measures for the management and protection of SSSIs and strengthens wildlife enforcement legislation.
The Natural Environment & Rural Communities Act 2006	This act (amongst other things) places a duty on public bodies to conserve biodiversity when exercising their normal functions, so far as is consistent with the proper exercise of those functions. It also requires the Secretary of State to publish a list of habitats and species that are of principal importance for the conservation of biodiversity in England.
The Infrastructure Planning (Decisions) Regulations 2010	These regulations ensure that the decision maker has regard of the United Nations Environmental Programme Convention on Biological Diversity 1992. In the UK this is guided by the UK Post-2010 Biodiversity Framework
The Hedgerows Regulations 1997	The Hedgerows Regulations is intended to protect important countryside hedges from damage or destruction.
Protection of Badgers Act 1992	The Protection of Badgers Act provides protection to badgers and their places of shelter (setts).

- 6.2.3 In addition to the policies listed in Table 6.1, the UK Government has a number of plans that inform the protection and enhancement of biodiversity in England. These include *A Green Future: Our 25 Year Plan to Improve the Environment* (the 25 year plan) published in 2018 by Defra. This plan is the government's vision for biodiversity improvements in England and identifies the need to explore how the principle of 'net gain' is embedded within the planning system. To achieve net gain the plan suggests that the wording surrounding this principle could be reviewed and strengthened in planning policy (e.g. the NPPF) and a consultation held to determine whether this should be a mandatory requirement.
- 6.2.4 In addition to the 25 year plan, *Biodiversity 2020: A strategy for England's wildlife and ecosystem services* and the *UK post-2010 Biodiversity Framework* provide further understanding of the government's strategy for biodiversity improvements and the measures taken to fulfil international commitments secured through convention.
- 6.2.5 Due regard will also be given to local policies where relevant.



6.3 Stakeholder engagement

- 6.3.1 Heathrow are proposing to use the framework of Defra's guidance *Evidence Plans for Nationally Significant Infrastructure Projects*⁸ to deliver technical consultation with specialist bodies with regard to biodiversity. An evidence plan is a formal mechanism to agree upfront with nature conservation bodies what information the applicant needs to supply to the Planning Inspectorate as part of a DCO application. The breadth of the guidance will be broadened to cover all aspects of the biodiversity assessment (as opposed to just Habitats Regulations Assessment (HRA) as per the guidance) and multiple stakeholders (as opposed to Natural England only). The aim of the evidence plan process is to enable the type and level of evidence (i.e. baseline information) required to be identified and agreed at an early stage, and the approaches to assessment to be discussed, improved and agreed.
- 6.3.2 The Biodiversity Evidence Plan process for the DCO Project (covering both HRA and Environmental Impact Assessment (EIA) aspects of the biodiversity assessment) is at an early stage, with the majority of technical consultation currently having been undertaken with Natural England, the Environment Agency and the Heathrow Strategic Planning Group⁹ (HSPG). However, invitations to participate in technical discussions have also been extended to the following organisations¹⁰:
1. The Royal Society for the Protection of Birds (RSPB)
 2. Berks, Bucks and Oxon Wildlife Trust
 3. Herts and Middlesex Wildlife Trust
 4. London Wildlife Trust
 5. Surrey Wildlife Trust
 6. Berkshire Local Nature Partnership
 7. Green Infrastructure Department, Greater London Authority
 8. Surrey Local Nature Partnership
 9. Crane Valley Partnership
 10. The Royal Parks

⁸ Defra, Evidence Plans for Nationally Significant Infrastructure Projects, 2012

⁹ The membership of the HSPG is set out in Section 4.9: Engagement.

¹⁰ The type and level of engagement with each of these organisations will vary dependent on their individual circumstances. Heathrow are however, committed to offering the same opportunity to engage to all organisations listed.



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11. Historic Royal Palaces

12. City of London¹¹

- 6.3.3 Technical consultation with Natural England and the Environment Agency began in early 2017, with engagement through meetings, conference calls and correspondence continuing regularly. Discussion with the HSPG has been focused at DCO Project milestones (e.g. the completion of the majority of field surveys in 2017 and the development of the materials published at the first public consultation), whilst a meeting with many of the stakeholders listed above was held in March 2018. Following the scoping process, technical consultations with all stakeholders will continue throughout the pre-application process, with the frequency and topics of discussions being tailored to fit with the DCO Project programme and with the interests and the desired level of engagement of each organisation.
- 6.3.4 Heathrow aim to proactively engage with the bodies listed in this section to:
1. Identify the baseline information required to inform an Ecological Impact Assessment (EclA) and an HRA of the DCO Project
 2. Agree suitable methods for the collection of the baseline information
 3. Identify the likely significant effects associated with the construction and operational phases of the DCO Project
 4. Determine the most appropriate way to assess the scale and extent of identified effects
 5. Identify local nature conservation priorities
 6. Enable DCO Project design (including mitigation and green infrastructure) to be informed by local knowledge and local targets.
- 6.3.5 Table 6.2 lists the organisations that have been consulted to date, and the topics that have been discussed.

¹¹ The City of London Corporation manages land within the vicinity of Heathrow (e.g. parts of Burnham Beeches Special Area of Conservation).



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Table 6.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Natural England	<p>Discussion and agreement of field survey protocols</p> <p>Discussion and agreement of approach to biodiversity offsetting</p> <p>Technical discussions regarding European Protected Species (EPS)</p> <p>Technical discussions regarding HRA screening</p> <p>Provision of updates on interim survey results</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussion and agreement regarding the final calculations with regard to biodiversity offsetting</p> <p>Discussions and agreement of Green Infrastructure design</p>
Environment Agency	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Technical discussions regarding HRA screening</p> <p>Technical discussions and agreement regarding biodiversity offsetting</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further relevant field survey methodology proposed</p> <p>Discussion and agreement regarding relevant field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to relevant potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
Highways England	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Discussions regarding biodiversity offsetting</p>	<p>Discuss the approach to assessment and mitigation, including relevant methodology guidance documents and their application.</p>
Heathrow Strategic Planning Group (HSPG)	<p>Presentation of field survey methodologies</p>	<p>Discussion and agreement of any further field survey methodology proposed</p>

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Consultee	Engagement undertaken to date	Proposed future engagement
	<p>Provision of updates on interim survey results</p> <p>Technical discussions regarding HRA screening</p> <p>Technical discussions regarding biodiversity offsetting</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
Crane Valley Partnership	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
London Wildlife Trust	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
Herts & Middlesex Wildlife Trust	<p>Presentation of field survey methodologies</p>	<p>Discussion and agreement of any further field survey methodology proposed</p>



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Consultee	Engagement undertaken to date	Proposed future engagement
	<p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
Surrey Wildlife Trust (also representing Surrey Local Nature Partnership)	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
The Royal Parks	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
Historic Royal Palaces	<p>Presentation of field survey methodologies</p>	<p>Discussion and agreement of any further field survey methodology proposed</p>



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
<p>City of London Corporation</p>	<p>General discussions regarding Burnham Beeches SAC and approach to HRA</p> <p>Discussions regarding biodiversity offsetting and Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>
<p>Greenspace Information for Greater London</p>	<p>Presentation of field survey methodologies</p> <p>Provision of updates on interim survey results</p> <p>Presentation of biodiversity offsetting strategy</p> <p>Discussions regarding Green Infrastructure design</p>	<p>Discussion and agreement of any further field survey methodology proposed</p> <p>Discussion and agreement regarding field survey reports</p> <p>Discussion and agreement of the approach to assessment with regard to potential effects (e.g. type of data analysis etc.)</p> <p>Discussion and agreement of final scope of assessment within the EclA and HRA</p> <p>Discussions and agreement of Green Infrastructure design</p>



6.4 Study area

- 6.4.1 The study area for biodiversity, is based on the maximum amount of land being considered for the full range of options which could form part of the final DCO Project taking into account all options presented in **Chapter 3: The DCO Project** and is shown on Figure 6.1.
- 6.4.2 The study area has developed throughout the first phase of baseline data collection taking place. Therefore, the area within which the data collection (both through desk study and field survey) has taken place to inform this EIA scoping exercise differs from the study area, although there is a high degree of overlap. To enable adequate distinction to be made within this report this area is referred to as the ‘baseline data collection area’ (refer to Figure 6.2). The baseline data collection area was developed through reference to early design information, zones of influence associated with likely significant effects (refer to paragraph 6.9.12 and Table 6.10) and accepted best practice field survey guidance (e.g. additional areas within 500m of the early design were added where appropriate to align with guidance on great crested newt surveys¹²).
- 6.4.3 Future desk study and field survey will cover the full study area once it is fully defined at PEIR and ES stage.

6.5 Sources of data used in scoping

Baseline data collection

- 6.5.1 Data collection to inform the baseline of the biodiversity assessment is ongoing. The baseline conditions presented in Section 6.6 represent a review of the currently available data. The desk-study, although based on the baseline data collection area, covers the study area in its entirety, whilst the field survey data gathered to date covers the accessible areas (as of January 2018) within it. The data described below, from the detailed desk study and field survey programme provides a robust context for the scoping of the biodiversity assessment.
- 6.5.2 Data collection began in the first quarter of 2017¹³. The baseline data collection area for the 2017 desk study and field surveys is shown on Figure 6.2; the extents of each survey type are described in the method statements provided in **Appendix 6.1: Biodiversity method statements**.
- 6.5.3 The biodiversity data used in the preparation of this Scoping Report comes from:

¹² Natural England, Great crested newts: surveys and mitigation for development projects, 2015

¹³ Other than with regard to wintering birds associated with the South West London Waterbodies and component SSSIs which began in the winter of 2014/15.



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1. A desk study focused on gathering information on statutory and non-statutory nature conservation designations and records of legally protected and conservation notable habitats, flora and fauna undertaken in 2017
2. A biodiversity field survey programme comprising a range of methodologies focused on describing the distribution and relative abundance of habitats, flora and fauna (refer to Section 6.5: Sources of data used in scoping)
3. A high-level biodiversity assessment undertaken to inform the discussions of the Airports Commission¹⁴
4. A review of previous biodiversity information that informed the assessment of current or previous planning applications in the study area (where available)
5. Discussions with local nature conservation practitioners¹⁵.

Desk study

- 6.5.4 A desk study was undertaken to obtain information relating to statutory and non-statutory sites designated for nature conservation, habitats and species of principal importance in England (referred to in this report as HPI and SPI respectively), and other legally protected, conservation notable and controlled species. This is provided in **Appendix 6.2: Biodiversity desk study report**.
- 6.5.5 The desk study undertaken in 2017 collected data from the area shown on Figure 6.2, plus extended areas of search that differed depending on the type of ecological feature for which information was being requested. Table 6.3 provides the extended search areas for each type of ecological feature.

¹⁴ Amec, Heathrow's North-West Runway: Biodiversity Assessment, June 2014

¹⁵ Discussions have been held with Heathrow's Environment Team who manage 13 biodiversity sites in the vicinity of the operational airport, the head ranger of Harmondsworth Moor and Colne Valley Park Community Interest Company who manage the Colne Valley Regional Park. These discussions were aimed at identifying potential sources of biological data and receiving the benefit of local knowledge. These discussions were not focused on consulting about elements of the Project.



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Table 6.3 Desk study search areas

Ecological feature	Search area ¹⁶ (km)
International / European sites ¹⁷	20 ¹⁸
Sites of Special Scientific Interest (SSSI)	2 ¹⁹
Local Wildlife Sites ²⁰ (LWS)	2
Records of Habitats of Principal Importance ²¹ (HPI)	2
Records of Species of Principal Importance (SPI)	2
Records of other legally protected and controlled species	2
Records of bat roosts	10 ²²

- 6.5.6 Data was gathered from publicly accessible databases including Magic²³ and the Environment Agency website²⁴ and through data requests made to a variety of nature conservation organisations.
- 6.5.7 Thirty-three organisations were contacted between March and June 2017 and asked to provide any relevant data held. Of these organisations, ten provided data directly, a further nine confirmed that they provide all of their data to local biological records centres (from which data had already been requested) and 13 are yet to respond. Those approached for data included biological records centres, large non-governmental organisations (i.e. nature conservation charities) and local voluntary interest groups.

¹⁶ The search area includes all land within a set distance of the baseline data collection area boundary (distance dependent on ecological feature).

¹⁷ This includes the nature conservation sites identified in Advice Note 10: Habitats Regulations Assessment relevant to Nationally Significant Infrastructure Projects, version 8 as being European sites or akin to European sites. Namely, Special Protection Areas (SPA), Special Areas of Conservation (SAC), candidate SACs and Sites of Community Importance (SCI); these sites are collectively referred to as Natura 2000 sites. Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites and proposed Ramsar sites should also be considered in the same manner in accordance with national planning policy.

¹⁸ A search area of 20km for International / European sites was determined based on the road traffic modelling accompanying the Airports Commission Final Report (July 2015) as nitrogen deposition associated with road traffic accessing / egressing the airport will need to be addressed within the HRA.

¹⁹ A 2km search area for other designated sites, SPI, HPI and other conservation notable or legally protected species is a precautionary professional judgement based on the potential extent of indirect effects.

²⁰ LWS are also known as Sites of Nature Conservation Importance (SNCI), Sites of Importance for Nature Conservation (SINC) and Biological Notification Sites (BNS) within the study area.

²¹ Habitats and species of principal importance for the conservation of biodiversity in England are those noted on a list produced in response to Section 41 of the Natural Environment and Rural Communities Act 2006.

²² The 10km search area for bat roosts is taken from Collins, J. (ed.) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition. The Bat Conservation Trust, London, 2016

²³ Magic www.magic.gov.uk (accessed 02 May 2018)

²⁴ Data.gov.uk search results <https://data.gov.uk/search?q=National+Fish+Populations+Database> (accessed 02 May 2018)



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- 6.5.8 In addition, information was gathered and collated from Heathrow’s Environment Team, from the Network Rail Western Rail Link to Heathrow project, the Environment Agency River Thames Scheme and from a number of landowners within the study area who held historic data linked to previous planning applications.

Baseline surveys

- 6.5.9 Twenty-four method statements have been produced that describe the field survey programme that commenced within the study area in 2017 (**Appendix 6.1**). The methodologies are based on relevant guidance documents and consultation with Natural England. All 24 method statements in **Appendix 6.1** have been formally agreed as suitable with Natural England.
- 6.5.10 The field survey programme has been designed to provide sufficient information on HPI, SPI and other legally protected, conservation notable and controlled species, and the general status and condition of all habitats within the study area. The field data is to provide the basis for a robust EclA and HRA to be undertaken for the DCO Project. Table 6.4 provides further information on the survey programme.

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Table 6.4 Survey programme

Method Statement	Primary guidance ²⁵	Notes
Phase 1 Habitat Survey	JNCC (2010) Handbook for Phase 1 Habitat Survey	This survey relates to all terrestrial and freshwater habitats (including lakes and reservoirs) within the study area.
National Vegetation Classification (NVC) survey	Rodwell <i>et al.</i> (2006) National Vegetation Classification: User's Handbook.	Habitats that have been or will be subject to NVC survey include qualifying habitat features of designated sites, habitats of principal importance in England, semi-natural habitats listed in relevant local Biodiversity Action Plans, all semi-natural woodlands, swamps and marshes and habitats supporting legally protected or conservation notable flora.
Hedgerows Regulations Assessment survey	Schedules 1 to 3 of the Hedgerows Regulations 1997	Native hedgerows within the study area that are known or likely to be species rich have been or will be subject to Hedgerows Regulations Assessment surveys.
Habitat condition assessment	JNCC (2004) Common Standards Monitoring for Lowland Grassland	<p>The use of this methodology relates specifically to unit 1 of Staines Moor SSSI (known as Poyle Meadow).</p> <p>It is noted that Natural England are in the process of undertaking a habitat condition assessment of the Staines Moor SSSI. Should this data be made available following completion in 2018 this survey effort may not be required.</p>
Ditch Habitat Survey	Natural England (2010), Farm Environment Plan (FEP) Manual	This survey relates to all ditches within the study area.

²⁵ Further information on other relevant guidance that informed survey methodologies can be found in [Appendix 6.1](#)

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Method Statement	Primary guidance ²⁵	Notes
River Corridor Survey (RCS)	National Rivers Authority (1992) River Corridor Surveys: Methods and Procedures	All rivers, streams, brooks and channels within the study area and any relevant upstream or downstream locations have been or will be subject to RCS.
River Habitat Survey (RHS)	Environment Agency (2003) River Habitat Survey in Britain and Ireland guidance manual	All rivers, streams, brooks and channels within the study area and any relevant upstream or downstream locations have been or will be subject to RHS.
Macrophyte survey	European Committee for Standardization (2014) BS EN 14184: 2014 Water Quality. Guidance for surveying aquatic macrophytes in running waters	All rivers, streams, brooks, channels within the study area and any relevant upstream or downstream locations have been or will be subject to macrophyte survey.
Macroinvertebrate survey	European Committee for Standardization (2014) BS EN ISO 10870: 2012 Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters	All rivers, streams, brooks and channels within the study area and any relevant upstream or downstream locations have been or will be subject to macroinvertebrate survey.
Fish survey	WFD-UKTAG (2008) UKTAG Rivers Assessment Methods Fish Fauna (Fisheries Classification Scheme 2) BSI (2013) BS EN 14011:2003 Water Quality – Guidance standard on sampling fish with electricity	All rivers, streams, brooks and channels within the study area and any relevant upstream or downstream locations have been or will be subject to fish survey.
Otter survey	Chanin (2003) Monitoring the Otter <i>Lutra lutra</i> Highways Agency (1999) Design Manual for Roads and Bridges – Volume 10 – Section 4 Part 4 – Nature Conservation Advice in Relation to Otters JNCC (2004) Common Standards Monitoring Guidance for Mammals	The survey relates to all aquatic and terrestrial habitat suitable for otter within the study area. Spot checks are also being conducted within a 5km search area of the study area.

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Method Statement	Primary guidance ²⁵	Notes
Water vole survey	<p>Strachan <i>et al.</i> (2011) The Water Vole Conservation Handbook</p> <p>Dean <i>et al.</i> (2016) The Water Vole Mitigation Handbook</p>	The survey relates to all aquatic and terrestrial habitat suitable for water vole within the study area.
Bat survey	<p>Collins (ed.) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines, 3rd edition.</p> <p>Mitchell-Jones (2004) Bat Mitigation Guidelines</p> <p>Mitchell-Jones & McLeish (2004) Bat Workers' Manual, 3rd edition</p> <p>Andrews <i>et al.</i> (2013) Bat tree habitat key</p> <p>BSI (2016) BS 8596:2015 Surveying for bats in trees and woodland</p>	The survey relates to habitats within which bats may roost, forage or commute within the study area.
Badger survey	<p>Natural England (2015) Badgers: surveys and mitigation for development projects</p> <p>Scottish Natural Heritage (2003) Best Practice Badger Survey Guidance Note</p>	All suitable habitats that may support badgers within the study area.
Hazel dormouse survey	Natural England (2011) Interim Advice Note – Dormouse Surveys for Mitigation Licensing – Best practice and common misconceptions	Suitable habitats within the study area.
Great crested newt survey	Natural England (2015) Great crested newts: surveys and mitigation for development projects	Suitable water bodies identified within the study area.

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Method Statement	Primary guidance ²⁵	Notes
	English Nature (2001) Great Crested Newt Mitigation Guidelines	
Reptile survey	Froglife (1999) Advice Sheet 10 - Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation.	Suitable habitats within the study area.
Breeding bird survey	Gilbert <i>et al.</i> (1998) Bird Monitoring Methods: A manual of techniques for key UK species.	Surveys were carried out in all suitable habitats within the study area. Only areas of continuous hard standing such as car parks and areas of commercial property were omitted.
Breeding kingfisher survey	BTO (1998) Waterways Breeding Bird Survey	Surveys were carried out along main watercourses and waterbodies within the study area.
Breeding little ringed plover survey	Conway <i>et al.</i> (2008) UK population estimates from the 2007 little ringed plover and ringed plover surveys	No suitable habitats were accessible during 2017. Potential nesting locations have been identified and will be assessed during 2018.
Winter bird survey - waterbodies	Bibby <i>et al.</i> (2000) Bird Census Techniques	<p>Surveys were completed at waterbodies corresponding to the South West London Waterbodies SPA and associated functional habitats within the study area. Additional waterbodies functionally linked to the SPA outside the study area were also monitored (refer to Appendix 6.1)</p> <p>This survey type began in the winter of 2014/15 and has been undertaken in the three subsequent winter periods (i.e. completing in March 2018).</p>
Terrestrial wintering bird survey	Atkinson <i>et al.</i> (2006) A detailed assessment of the pilot survey: counting birds on farmland in winter	Surveys were carried out in all suitable habitats within the study area. Only areas of continuous hard standing such as car parks and areas of commercial and residential property were omitted.

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Method Statement	Primary guidance ²⁵	Notes
Winter bird disturbance and distribution survey	A unified guidance document is not available covering this type of survey. Rather a method agreed with Natural England for a development project with an analogous situation was adopted (refer to Appendix 6.1 for further details)	<p>Twelve waterbodies were selected for survey on the basis of their position in relation to existing aircraft flight routes and other potential disturbance pathways. Sites supporting notable species including shoveler and gadwall were selected as a priority. All of these waterbodies lie within the study area (Appendix 6.1).</p> <p>This survey type began in the winter of 2016/17 and was repeated in the winter of 2017/18.</p>
Terrestrial invertebrate survey	<p>Drake <i>et al.</i> (2007) Surveying terrestrial and freshwater invertebrates for conservation evaluation</p> <p>Hill <i>et al.</i> (2005) Handbook of Biodiversity Methods</p>	Suitable habitats within the study area.



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6.6 Baseline conditions

Designated sites

6.6.1 There are nine European sites inside the 2017 baseline data collection area²⁶ boundary or within 20km of the boundary. These European sites are listed in Table 6.5, with mapping provided in **Appendix 6.2**.

Table 6.5 European sites designated for nature conservation

Site name	Designated features	Distance from baseline data collection area
South-West London waterbodies SPA	Wintering populations of gadwall <i>Anas strepera</i> and shoveler <i>Anas clypeata</i>	0km
South-West London waterbodies Ramsar site	Wintering populations of gadwall and spring/autumn peaking populations of shoveler	0km
Windsor Forest and Great Park SAC	Atlantic acidophilous beech forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrublayer (Beech forests on acid soils) Old acidophilous oak woods with <i>Quercus robur</i> on sandy plains. (Dry oak-dominated woodland) Violet click beetle <i>Limoniscus violaceus</i>	4.25km
Richmond Park SAC	Stag beetle <i>Lucanus cervus</i>	8.17km
Burnham Beeches SAC	Atlantic acidophilous beech forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the shrublayer (Beech forests on acid soils)	9.29km
Thames Basin Heaths SPA	Breeding woodlark <i>Lullula arborea</i> , nightjar <i>Caprimulgus europaeus</i> and Dartford warbler <i>Sylvia undata</i>	10.02km
Thursley, Ash, Pirbright and Chobham SAC	Depressions on peat substrates of the <i>Rhynchosporion</i> European dry heaths Northern Atlantic wet heaths with <i>Erica tetralix</i> . (Wet heathland with cross-leaved heath)	10.16km
Wimbledon Common SAC	European dry heaths Northern Atlantic wet heaths with <i>Erica tetralix</i> . (Wet heathland with cross-leaved heath) Stag beetle	11.81km

²⁶ Refer to paragraph 6.4.2 for a description of the difference between the baseline data collection area for 2017 and the study area.



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Site name	Designated features	Distance from baseline data collection area
Chiltern Beechwoods SAC	<i>Asperulo-Gagetum</i> beech forests Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (*important orchid site)	17.56 km

6.6.2 There are four SSSIs inside the 2017 baseline data collection area boundary or within 2km of it. These are listed in Table 6.6 with mapping provided in **Appendix 6.2**.

Table 6.6 Sites of Special Scientific Interest within 2km

Site name	Designated features	Distance from baseline data collection area
Staines Moor SSSI	Wintering aggregations of goosander <i>Mergus merganser</i> , pochard <i>Aythya ferina</i> , shoveler and tufted duck <i>Aythya fuligula</i> Flowing waters – Type III: base rich, low energy lowland rivers and streams, generally with a stable flow regime MG13 <i>Agrostis stolonifera</i> – <i>Alopecurus geniculatus</i> grassland MG5 <i>Cynosurus cristatus</i> – <i>Centaurea nigra</i> grassland S22 <i>Glyceria fluitans</i> water-margin vegetation Vascular plant assemblage	0km
Wraysbury Reservoir SSSI	Wintering aggregations of cormorant <i>Phalacrocorax carbo</i> , great crested grebe <i>Podiceps cristatus</i> and shoveler	0km
Wraysbury No. 1 Gravel Pit SSSI	Wintering aggregations of gadwall	1.23km
Wraysbury and Hythe End Gravel Pits SSSI	Wintering aggregations of gadwall, goosander, tufted duck Lowland open waters and their margins	1.47km

6.6.3 The 2017 desk study returned details of 53 LWS and four Local Nature Reserves (LNR) (a number of LWS and LNR designations overlap). Of these 14 were within the baseline data collection area and 39 were within 2km of it. Details and locations of the LNRs and non-statutory sites can be found in **Appendix 6.2**.



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Habitats and species

- 6.6.4 A programme of field survey was undertaken on accessible land parcels²⁷ within the baseline data collection area. A summary of the desk study and field survey results are provided below broken down by habitat and species groupings.
- 6.6.5 Some field survey data are not currently available as levels of access to private land were not total in 2017. Areas where further access can be negotiated with landowners/stakeholders will be surveyed in 2018, and additional information gathered from the public highway and Public Rights of Way (PRoW) will also be provided where possible. Areas where survey has not been possible pre-application, or planned activities have been curtailed, will be highlighted at later stages of the DCO Project, with suitable mitigation measures dealing with this issue suggested and discussed with consultees.

Habitats

- 6.6.6 This section provides a summary of Phase 1 Habitat, NVC and hedgerow surveys. The main broad habitats types identified within the areas subject to survey in 2017 include:
1. Woodland (lowland mixed deciduous woodland, wet woodland and plantation woodland)
 2. Hedgerows
 3. Grasslands
 4. Open Water
 5. Swamp.
- 6.6.7 To date 646 hectares (ha) have been subject to Phase 1 Habitat Survey, 10ha have been covered by NVC survey and 83 hedgerows have been considered following the methods described within the Hedgerows Regulations 1997.
- 6.6.8 Figure 6.3 shows the habitat classification determined through the Phase 1 Habitat Survey; descriptions of broad habitat types are provided below.

Woodland

- 6.6.9 Approximately 53ha of woodland habitats have so far been recorded. With the exception of one larger woodland spanning almost 5ha, these woodland blocks tend to be relatively small in extent (0.03ha - 1.5ha) and are heavily influenced by edge effects (i.e. the changes in community structure at the boundary between two or more habitat types). The broad woodland types present include broadleaved

²⁷ Accessible land parcels are those where an agreement has been reached between Heathrow and those with interests in a given land parcel to permit access.



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semi-natural woodland (~19ha), and plantation woodland (~34ha). Some of the broadleaved semi-natural woodland on site were HPI; with ~5ha qualifying as lowland mixed deciduous woodland, and ~5ha qualifying as wet woodland.

6.6.10 The woodland areas that have been subject to NVC survey have been classified as:

1. W6 *Alnus glutinosa* - *Urtica dioica* (Lowland mixed deciduous woodland)
2. W8 *Fraxinus excelsior* - *Acer campestre* - *Mercurialis perennis* (Wet woodland).

6.6.11 Both of these woodland types qualify as HPI.

Hedgerow

6.6.12 A total of 83 hedgerows were identified during the Phase 1 Habitat Surveys undertaken in 2017. Of these, 76 were native, consisting of greater than 80% native species, and 72 were over 20m in length. Seven were classed as species-rich, as they were found to support at least five native woody species in any 30m section. Two of these species rich hedgerows were classified as 'important' under the Hedgerows Regulations 1997. All native hedgerows over 20m in length (both species-rich and species-poor), are defined as HPI.

Grassland

6.6.13 A total of 254ha of grassland was identified during the Phase 1 Habitat Survey in 2017. Grassland types identified were:

1. Semi-improved neutral grassland
2. Improved grassland
3. Marshy grassland
4. Poor semi-improved grassland
5. Amenity grassland.

6.6.14 The majority of the grassland surveyed was species-poor. Approximately 45ha (17.5%) of accessible grassland that has the potential to be species-rich and will be subject to NVC surveys in 2018. The majority of these areas lie within the Colne Valley, within and adjacent to the Lower Colne SINC.

Open water

6.6.15 Nine lakes, four rivers, 20 ponds and 67 ditches were surveyed as part of the Phase 1 Habitat Survey in 2017. All lakes, rivers, and ponds are HPIs. Further assessment of ditches will take place in 2018 through targeted ditch assessment



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surveys as described in **Appendix 6.1**. Lakes, rivers and ponds, where not surveyed in 2017, will be subject to the relevant survey methods as described in Table 6.4.

Swamp, marginal and inundation

- 6.6.16 Swamp habitats accounted for approximately 4ha of the area where survey was undertaken in 2017, and was typically found as reedbeds around lake perimeters and in isolated wetland areas. The largest singular swamp was an artificial reedbed located within Mayfield Farm (a water treatment facility operated by Heathrow) measuring just over 2ha in extent. Marginal and inundation habitats were also found associated with river and pond habitats.

Other habitats

- 6.6.17 The remainder of the areas subject to survey in 2017 comprised of habitats such as tall ruderal vegetation, arable land, and areas of hard standing.

Notable plant species

- 6.6.18 No plants listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended) or Schedule 5 of the Conservation of Habitats and Species Regulations 2017 were identified during the desk study or during surveys in 2017.
- 6.6.19 The desk study recorded one Nationally Scarce species, annual beard grass *Polypogon monspeliensis*. Four of the plants recorded during 2017 surveys are listed as near-threatened in the Vascular Plant Red List for England (Stroh *et al.*, 2014): marsh pennywort *Hydrocotyle vulgaris*, field pepperweed *Lepidium campestre*, hoary plantain *Plantago media* and shepherd's cress *Teesdalia nudicaulis*.
- 6.6.20 A total of 33 invasive plant species were identified from the desk study, with over 747 individual records. These include species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), including Japanese knotweed *Fallopia japonica* and Himalayan balsam *Impatiens glandulifera*, both of which were recorded during the 2017 surveys, along with rhododendron *Rhododendron ponticum*, cotoneaster *Cotoneaster spp.* and floating pennywort *Hydrocotyle ranunculoides*.

River Habitats (RCS and RHS)

- 6.6.21 River Corridor Surveys (RCS) and River Habitat Surveys (RHS) were undertaken at locations along the Longford River, Duke of Northumberland's River, Horton



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Brook, Colne Brook, Wraysbury River and River Colne in 2017²⁸. All channels surveyed were found to have been subject to heavy modification.

- 6.6.22 All river sections surveyed (referred to as reaches) contained re-sectioned (i.e. widened and deepened reaches) and/or reinforced channels (i.e. banks strengthened), with several major bridges and weirs also recorded.
- 6.6.23 Habitat quality varies between the water courses. Habitat diversity along the Longford River and Duke of Northumberland's River is relatively low (although habitat creation measures have been implemented) whilst the Horton and Colne Brook, as well as the Wraysbury River and River Colne, support a more diverse natural habitat.

Macrophytes

- 6.6.24 Species typical of standing or slow flowing water were common in all water courses surveyed, these included clubrush *Schoenoplectus lacustris*, yellow water-lily *Nuphar lutea*, arrowhead *Sagittaria sagittifolia*, least bur-reed *Sparganium natans* and common duckweed *Lemna minor*. Species typical of eutrophic conditions (e.g. nutrient rich conditions) included fennel pondweed *Potamogeton pectinatus* and fool's watercress *Apium nodiflorum*.
- 6.6.25 The Longford River and Duke of Northumberland's River are severely modified with reinforced concrete banks. The vegetation present in these rivers was planted within gabion baskets using coir matting. These are placed periodically along the reaches and one particular section (along the western boundary of the airport) contained an abundance of established common reed which covers over 70% of the width of the river.

Fish

- 6.6.26 The desk study, which included Environment Agency monitoring data, showed the presence of a diverse fish community dominated by cyprinid species (e.g. chub) within the Horton Brook, River Colne, Colne Brook, Wraysbury River, The Duke of Northumberland's River and Longford River. Two species of conservation interest were identified namely European bullhead *Cottus gobio*, within the Colne Brook, River Colne, Wraysbury River, River Crane and Duke of Northumberland's River and European eel *Anguilla anguilla* within the River Colne, Poyle Channel, Colne Brook, Wraysbury River, River Crane and Duke of Northumberland's River.
- 6.6.27 A low number (typically between one to three individuals) of brown trout *Salmo trutta* were recorded in 2003, 2007 and 2014 from reaches of the Wraysbury River within Harmondsworth Moor. Although brown trout was recorded in low numbers

²⁸ Access for survey of the River Crane was not available during the 2017 field survey season. This river will be subject to survey in 2018.



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on each occasion, their persistence over time is an indicator of good water quality, habitat diversity and healthy ecological function within the Wraysbury River.

- 6.6.28 Analysis of environmental DNA within water samples collected in 2017 identified 14 species within the rivers named in paragraph 6.6.21. These species were barbel *Barbus barbus*, bream *Abramis brama*, chub, dace, European bullhead, gudgeon *Gobio spp.*, minnow *Phoxinus phoxinus*, perch *Perca fluviatilis*, pike *Esox lucius*, roach *Rutilus rutilus*, stone loach *Barbatula barbatula*, tench *Tinca tinca* and three-spined stickleback *Gasterosteus aculeatus*. The species identified are those that would typically be expected to occur in the area around Heathrow and are characteristic of a fish community dominated by cyprinid species.

White clawed crayfish

- 6.6.29 There are two records of white clawed crayfish *Austropotamobius pallipes* from 2010 located just outside the boundary of the 2017 desk study. These species records are associated with water courses that show poor connectivity to habitats within the baseline data collection area. The white clawed crayfish is a SPI.

Otter

- 6.6.30 One non-statutory site, Little Britain SINC, lists otter *Lutra lutra* within the citation. Little Britain SINC is located within the Colne Valley, comprising a variety of habitats including lakes, rivers (the River Colne and River Frays), scrub, areas of wasteland, woodland and neutral grassland. The river corridors provide connectivity between the SINC and habitats within the study area. The desk study identified one record of otter from 2010, located along the northern section of the River Colne.
- 6.6.31 The 2017 field surveys confirmed otter activity along six water courses and three water bodies. These include:
1. Colne Brook
 2. Poyle Channel
 3. Wraysbury River
 4. River Colne
 5. River Longford / Duke of Northumberland's River
 6. River Crane
 7. Colnebrook West Lake
 8. Orlitts Lake
 9. Old Slade Lake.



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- 6.6.32 Field signs recorded comprised mainly of otter spraints (i.e. faeces) of varied ages with occasional records of slides and feeding signs. (Figure 6.4). Evidence of otter resting sites were recorded along Colne Brook, Wraysbury River, River Colne and Orlitts Lake.
- 6.6.33 Seven spraints in suitable condition were sent for DNA analysis, all were confirmed as being otter. Of the seven spraints analysed, four were confirmed as being deposited by females; the sex could not be determined for the remaining three samples due to the DNA being degraded. The potential for identifying individual animals from spraint samples is currently being investigated.
- 6.6.34 Terrestrial habitats associated with water courses have been identified with potential to support breeding activity by otter. Mature trees, dense scrub and a proliferation of willows are present alongside the River Colne, Colne Brook (through Old Slade Lake LWS) and along the Wraysbury River.

Water vole

- 6.6.35 Four non-statutory sites have water vole *Arvicola amphibius* noted within their citation. These include Little Britain SINC (within the Colne valley); Lower Colne SINC (associated with sections of the rivers Colne, Wraysbury and Frays); Crane Corridor SINC (including 5km of the River Crane) and the Bedfont SINC (alongside the Duke of Northumberland's River). The river corridors provide connectivity between the SINC's listed and other suitable habitats.
- 6.6.36 The desk study identified 39 records of water voles. No location details were provided but the closest record lies 0.22km north of the baseline data collection area. Anecdotal reports describe a release programme for water vole taking place on the Bone Head ditch within Staines Moor SSSI approximately ten years ago. The success of this program is unknown, although targeted surveys on accessible land will be undertaken in this area in 2018.
- 6.6.37 No evidence of water vole activity was confirmed during the surveys completed in 2017. However, suitable habitat for the species has been identified across the study area, and these habitats will be surveyed in 2018.
- 6.6.38 The presence of American mink *Neovison vison*, a species which predates water vole, across the study area has been confirmed by the desk and field surveys. Evidence of mink activity was found during the 2017 field surveys on the Colne Brook, Wraysbury River and Orlitts Lake.

Bats

- 6.6.39 The Little Britain SINC has three bat species listed on its citation namely noctule *Nyctalus noctula*, Daubenton's bat *Myotis daubentonii* and soprano pipistrelle *Pipistrellus pygmaeus*. The desk study identified that a minimum of seven species



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had been recorded using habitats within the data collection area including common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle, Nathusius' pipistrelle *Pipistrellus nathusii*, brown long-eared bat *Plecotus auritus*, noctule, Daubenton's bat, and serotine *Eptesicus serotinus*. This included records of roosts at six locations within the data collection area for soprano and common pipistrelle and pipistrelles which could not be assigned to either species, brown long-eared bat, serotine and noctule.

- 6.6.40 Field survey data collected in 2017 confirmed at least nine bat species, this included all those listed above plus Leisler's Bat *Nyctalus leisleri* and Natterer's bat *Myotis nattererii*. Some bat calls recorded during the survey programme in 2017 were unable to be identified to species level and records of bats from the *Myotis* genus (e.g. Daubenton's bat, Natterer's bat etc.) were grouped together because of the difficulty in separating these species from their calls alone.
- 6.6.41 Common pipistrelle and soprano pipistrelle bats were the most frequently recorded species during the 2017 survey. *Myotis* bats were also regularly recorded, with Daubenton's bats being the most frequently noted of this group (determined during the trapping surveys). Low numbers of noctule, serotine, Leisler's bat, Nathusius' pipistrelle, brown long-eared and Natterer's bat were recorded during the 2017 survey. During live trapping of bats (described in [Appendix 6.1](#)), between one and seven bats were caught from the species recorded in low numbers in comparison to over 200 soprano pipistrelles and over 150 Daubenton's bats.
- 6.6.42 Activity levels were highest in open water habitats, with concentrated activity around the water bodies within the Old Slade Lake LWS and Swan Lake. The River Colne and Colne Brook also supported high levels of bat activity. Bat activity levels across the study area recorded in 2017 are presented in Figure 6.5.
- 6.6.43 Field surveys completed during 2017 identified bat roosts across the study area in four buildings²⁹ (brown-long eared bat, soprano and common pipistrelle and an unconfirmed species were present in one or more of these buildings), in two underpasses (including a Daubenton's bat maternity roost and soprano pipistrelle roosts) and a single tree (Figure 6.6).

Badger

- 6.6.44 The 2017 desk study data provided eight historical records of badger *Meles meles*. All records were located close to, but outside of the data collection area. Four incidences of badgers were not supplied with location details as these were treated as confidential by the data supplier.

²⁹ On Figure 6.6 one of the buildings is marked as a 'land parcel'. This is because a radio-tagged bat was tracked back to a residential area, although the exact roosting location could not be identified.



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- 6.6.45 The 2017 surveys identified habitats with potential to support badger activity within the study area. Surveys identified a low density of badger activity, distributed across habitats present. No main setts or significant associated setts (i.e. well used annex or subsidiary setts) were found.

Hazel dormouse

- 6.6.46 The desk study has provided no records of hazel dormouse *Muscardinus avellanarius* within 2km of the data collection area.
- 6.6.47 The scoping exercise identified 15 distinct locations within the study area that provide suitable habitat to support hazel dormouse. These areas (all of which are accessible) will be subject to hazel dormouse survey in 2018.

Great crested newt

- 6.6.48 No historical records of great crested newt *Triturus cristatus* within 2km of the baseline data collection area were returned as part of the desk study.
- 6.6.49 A total of 226 water bodies were identified as requiring further consideration with regard to great crested newt following a desk-based exercise. Suitable information was available from field survey scoping visits to initially assess 93 of these water bodies (50 ponds and 43 ditches) in 2017. Of these 93 water bodies, 17 ponds and nine ditches were identified as having the potential to support great crested newt. Eighteen (ten ponds and eight ditches) of these were accessible for further survey (Figure 6.7). The ten ponds were considered in line with the Habitat Suitability Index and had water samples taken for eDNA analysis to test for the presence of great crested newt. The eight ditches were subject to eDNA analysis only.
- 6.6.50 No great crested newt were detected during the surveys carried out in 2017. Smooth newt *Lissotriton vulgaris* were recorded in seven of the 18 water bodies.

Reptile

- 6.6.51 The desk study returned a total of 138 records of reptiles comprising 73 records of slow worm *Anguis fragillis*, 64 records of grass snake *Natrix helvetica* and one record of adder *Vipera berus* from within 2km of the baseline data collection area.
- 6.6.52 During the course of the field survey, two species of reptile were recorded: slow worm and grass snake. Figure 6.8 shows where reptiles were recorded during 2017.



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Birds - breeding

- 6.6.53 The desk study returned a total of 6,471 bird records. Eight species listed on Schedule 1 of the Wildlife & Countryside Act 1981 (as amended) (herein referred to as Schedule 1 species) have been recorded as breeding within, or less than 2km, from the baseline data collection area boundary. These are barn owl *Tyto alba*, black redstart *Phoenicurus ochruros*, Cetti's warbler *Cettia cetti*, hobby *Falco subbuteo*, kingfisher *Alcedo atthis*, little ringed plover *Charadrius dubius*, peregrine *Falco peregrinus* and red kite *Milvus milvus*.
- 6.6.54 A total of 54 species have been confirmed as breeding within the areas subject to survey in 2017. This included species listed on Schedule 1, the Birds of Conservation Concern red list³⁰ and the list of SPI. Table 6.7 provides a summary of the status of each conservation notable species recorded.

Table 6.7 Breeding bird summary

Species	No. of territories recorded in 2017	Status
Bullfinch	3	SPI
Cetti's warbler	2	Schedule 1
Dunnock	84	SPI
Grey wagtail	1	Birds of Conservation Concern (BoCC) Red Listed
House sparrow	51+	SPI, BoCC Red Listed
Kingfisher	1	Schedule 1
Lapwing	4	SPI, BoCC Red Listed
Linnet	2	SPI, BoCC Red Listed
Mistle thrush	1	BoCC Red Listed
Reed bunting	1	SPI
Skylark	16	SPI, BoCC Red Listed
Starling	47+	SPI, BoCC Red Listed
Song thrush	39	SPI, BoCC Red Listed

- 6.6.55 Assemblages of greatest diversity and species of higher conservation concern tended to be found in highest concentrations in areas of scattered and dense scrub. Areas of extensive urban habitat were also found to be of value to a range

³⁰ Eaton et al. 2015, Birds of Conservation Concern 4: the population status of birds in the UK, Channel Islands and Isle of Man, December 2015



of notable species including house sparrow *Passer domesticus*, starling *Sturnus vulgaris*, song thrush *Turdus philomelos* and mistle thrush *Turdus vicivorus*.

- 6.6.56 Kingfisher were recorded on all of the surveyed watercourses with the exception of the River Crane. Key areas of activity have been identified on the River Colne, Wraysbury River, Duke of Northumberland's River and Colne Brook. These are shown on Figure 6.9. In these areas, activities associated with breeding have been recorded, such as adult birds carrying fish and adult birds calling loudly to one another. Juvenile birds have also been recorded in a number of locations suggesting that kingfisher breed successfully in the area.

Birds – wintering

- 6.6.57 Results gathered between 2014 and 2017 from the reservoirs and lakes in the study area (described as Winter Bird Surveys – Waterbodies in Table 6.4) show considerable variation in both distribution and peak number of target species. Table 6.8 summarises the overall peak and mean counts for waterbirds listed on the designations of the South West London Waterbodies SPA (gadwall and shoveler) and the underlying SSSI citations.

Table 6.8 Wintering bird summary – water body counts

Species	2014/15*		2015 / 16		2016 / 17	
	Peak	Mean	Peak	Mean	Peak	Mean
Gadwall	552	249.36	637	361	455	251.42
Shoveler	182	96.21	849	172.35	338	178.57
Black-necked grebe	3	0.79	9	3.2	4	1.64
Cormorant	516	139.5	518	177.2	409	133.79
Goosander	18	3.57	18	5.1	9	1.57
Great-crested grebe	192	103.21	192	115.8	395	212.07
Goldeneye	54	25.71	75	32	79	40
Pochard	219	102.2	1,014	417.6	418	128.14
Smew	4	0.57	3	0.7	12	1.64
Tufted duck	1764	1214.35	3661	2370.8	2815	1582.5

*Access restrictions in 2014/15 resulted in fewer waterbodies being surveyed during this period.

- 6.6.58 Mean counts for the waterbodies combined suggest that gadwall numbers have remained fairly stable while shoveler numbers have fluctuated. Key locations for gadwall were focused around the Wraysbury and Horton area with the population favouring waterbodies such as Kingsmead, Colne Mere and Horton South.



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Shoveler were shown to be more site faithful with peak counts occurring at Staines Reservoir (North and South) in all years of monitoring.

- 6.6.59 Monitoring of bird responses to disturbance events is ongoing in 2017/18 on 12 water bodies (Figure 6.10) and only preliminary results from 2016/17 are presented here. Aircraft were the most commonly recorded potential disturbance agent in the area with a total of 4,204 flights directly overhead of the monitored water bodies or proximal to their boundaries during the 2016/17 survey period. Of these 4,204 overflights, only 29 resulted in a detectable response by waterbirds. Gadwall and shoveler were disturbed on a single occasion each, with other species occasionally disturbed being coot, cormorant, great crested grebe, pochard and tufted duck.
- 6.6.60 Waterbirds were much more frequently disturbed by people undertaking recreational activities such as walking, jogging, angling or bird watching.
- 6.6.61 Winter bird survey results of terrestrial habitats occurring across the winter of 2017/18 are not yet collated. However, the community present is dominated by wintering flocks of passerines (e.g. wintering thrushes) with occasional wildfowl and waders present.

Terrestrial invertebrates

- 6.6.62 Terrestrial invertebrate species considered to be conservation notable are SPIs and species included in the following lists:
1. Nationally Rare species identified in the British Red Data Books (RDB)³¹ as they are estimated to occur in 15 or fewer ten-kilometre squares in Great Britain³²
 2. Nationally Scarce³³ species estimated to occur within the range of 16 to 100 ten-kilometre squares of the British National Grid system³⁴.
- 6.6.63 The desk study identified records of 72 conservation notable invertebrate species (from a total of 2,785 records). These included 42 SPI, two species listed as endangered or vulnerable in the British RDB and 28 Nationally Scarce species.
- 6.6.64 Initial terrestrial invertebrate surveys were undertaken in late August and early September 2017. A total of 266 invertebrate species were recorded from all surveys. Fifteen conservation notable species were identified as using habitats

³¹ Duffey, British red data books: Vol 3. Invertebrates other than insects; and Shirt, 1987, British red data books: Vol. 2 Insects are relevant to terrestrial invertebrates, 1992

³² Nationally Rare species are further categorised as follows: and are categorised as follows: RDB 1 (Endangered), RDB 2 (Vulnerable), RDB 3 (Rare), or RDB K (unknown).

³³ Ball, Terrestrial and freshwater invertebrates with Red Data Book, Notable or habitat indicator status, 1986

³⁴ Nationally Scarce species are categorised into two National Notable groups where sufficient information is available: Na (occur within 16 to 30 ten-km squares) and Nb (occur within 31 to 100 ten-km squares).



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within the study area, these are listed in Table 6.9. These included brown-banded carder bee *Bombus humilis* and small heath butterfly *Coenonympha pamphilus*.

Table 6.9 Terrestrial invertebrate species of importance recorded during field surveys

Species	Common name	UK status	Habitat preferences
<i>Acinia corniculata</i>	A fruitfly	Red Data Book 1	Meadows, fens and drier grassland, with larvae dependent on knapweed <i>Centaurea jacea</i>
<i>Bombus humilis</i>	Brown-banded carder bee	SPI	Many potential supporting habitats; populations can be found on flowery brownfield sites (this includes semi-improved grassland, tall ruderal and ephemeral/short perennial habitats described in the Phase 1 Habitat Surveys). Flowers visited include legumes, labiates and honeysuckle.
<i>Cistogaster globosa</i>	A parasitic fly	Red Data Book 2	Parasitoid of <i>Aelia</i> shieldbugs, which tend to occur in tall and rank dry grassland habitats
<i>Coenonympha pamphilus</i>	Small heath butterfly	SPI	Grassland and heaths with fine-leaved grasses, especially in dry, well-drained areas
<i>Crossocerus (Crossocerus) distinguendus</i>	A solitary wasp	Nationally Scarce A	Open habitats, including scrub and woodland edges
<i>Dichetophora finlandica</i>	A snail-killing fly	Red Data Book 3	Damp grassland or marshy areas
<i>Dicranomyia ventralis</i>	A crane fly	Nationally Scarce	Wet habitats, such as marshes, leaf litter, wet areas of woods
<i>Drymus (Drymus) latus</i>	A ground bug	Nationally Scarce B	Confined to south-east England, recorded from a variety of habitats but host plant is unclear; mainly associated with sparsely-vegetated sites in London.
<i>Hippodamia (Adonia) variegata</i>	Adonis' ladybird	Nationally Scarce	Most frequent on ruderal, weedy plants on sandy, open soils
<i>Hylaeus (Lamdopsis) dilatatus</i>	A yellow-faced bee	Red Data Book 3	Found in a variety of habitats with a wide variety of flowers used, particularly umbellifers, thistles and brambles.
<i>Larinus planus</i>	A weevil	Nationally Scarce B	Reliant on thistle species, which larvae feed on
<i>Meligethes fulvipes</i>	A pollen beetle	Nationally Scarce	Flowering plants



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Species	Common name	UK status	Habitat preferences
<i>Olibrus flavicornis</i>	A beetle	Red Data Book K	Associated with grassland
<i>Philanthus triangulum</i>	The Bee Wolf (a solitary wasp)	Red Data Book 2	Sandy habitats; includes isolated sandy areas such as chalk heath, post-industrial sites, city parks and gardens
<i>Sapromyza quadricincta</i>	A lauxanid fly	Nationally Scarce	Often in shaded areas with some trees and shrubs, and on post-industrial sites

6.7 Likely significant effects requiring assessment

- 6.7.1 In order to identify likely significant effects on ecological features it is necessary to understand the activities associated with the construction (e.g. vegetation clearance) and operation of the DCO Project (e.g. such as take-off and landing of aircraft) in order to identify zones of influence (refer to paragraph 6.9.12), the likely effects that may occur in the environment as a result (e.g. the generation of aircraft noise may result in the disturbance of fauna causing increased energy expenditure and reduced energy intake resulting in lower survival and productivity rates and a consequent reduction in population size) and the ecological features³⁵ that may be subject to effect.
- 6.7.2 Table 6.10 outlines the generic activities, effects and ecological features that may occur due to the construction and operation of the DCO Project, and are therefore being scoped in to the assessment at this stage. As the development of the DCO Project is ongoing, the exact locations, the ecological features potentially affected and the extent of the effects (either positive or negative) cannot yet be fully determined. The evolution of the design (including how it may be implemented) and the collection of further field survey data will enable this list of effects to be developed in a greater level of detail at later stages of the pre-application process.

³⁵ Ecological feature is the term used within EclA in place of receptor. Refer to Section 6.9 for a description of the approach to the assessment.



Table 6.10 Likely effect requiring assessment

Activity	Effect	Ecological features
Construction		
<p>Change of land use including ground clearance for construction sites (including laydown areas, staff facilities etc.), enabling works (including demolition), airfield expansion (including earthworks), roads and campus development (including presence of workforce and use of plant)</p>	<p>Degradation and/or loss of habitat (including through soil compaction).</p> <p>Reduction in the availability of foraging and commuting habitat and resting or breeding sites</p> <p>Killing or injury of fauna through the removal of occupied resting or breeding sites.</p> <p>Loss of ecological connectivity through severance of habitats resulting in fragmentation</p> <p>Introduction or spread of invasive species.</p>	<p>Terrestrial habitat</p> <p>Terrestrial flora and fauna including birds, otters and bats.</p> <p>Features of sites designated for nature conservation</p>
<p>Use of temporary lighting for security purposes or to illuminate construction working areas.</p>	<p>Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites.</p> <p>Disruption of the physiology of species reliant on natural day/night and seasonal light level changes resulting in loss of fitness and reduction in survival rates.</p> <p>Loss of ecological connectivity through severance (due to introduction of light) of habitats resulting in fragmentation.</p>	<p>Bats (various species)</p> <p>Birds</p> <p>Otters</p> <p>Badgers</p>
<p>Production of aural and visual stimuli and vibration from construction activities such as vehicular movements, piling or site personnel.</p>	<p>Disturbance and displacement of species susceptible to noise/visual disturbance resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.</p>	<p>Breeding and wintering birds</p> <p>Otters</p> <p>Bats (various species)</p> <p>Badgers</p>



Activity	Effect	Ecological features
		Features of sites designated for nature conservation
<p>Construction/alteration of drainage to facilitate construction works.</p>	<p>Changes to local hydrology resulting in changes or loss of surrounding habitats with subsequent effects on the fauna they support.</p>	<p>Terrestrial and freshwater habitat</p> <p>Terrestrial and freshwater flora and fauna including birds, otters and bats.</p> <p>Features of sites designated for nature conservation</p>
<p>Creation of airborne particles (e.g. dust) during construction activities and vehicle movements.</p>	<p>Loss or damage of sensitive flora through smothering resulting in effects on habitat composition and the fauna that it supports.</p> <p>Deposition of dust resulting in enrichment of sensitive HPIs, including those contained within statutory designated sites, leading to alteration of flora through changes in baseline conditions and the species which they support.</p> <p>Direct effects on invertebrates through ingestion or direct deposition on sedentary species.</p>	<p>Terrestrial and freshwater habitats (and supported fauna)</p> <p>Terrestrial and freshwater invertebrates</p> <p>Features of sites designated for nature conservation</p>
<p>Realignment/diversion/ modification of river/stream channels; loss or modification of lakes, ponds, drains, ditches and ephemeral channels due to:</p> <ol style="list-style-type: none"> 1. Activities at Construction site (including laydown areas, staff facilities etc.) 2. Enabling works (including demolition) 3. Airfield expansion (including earthworks) and 4. Campus development (including presence of workforce and use of plant) within the 	<p>Freshwater habitat degradation and/or loss and/or reduction of geomorphological and flow diversity. Loss of ecological connectivity through severance of habitats resulting in fragmentation.</p> <p>A change in flow quantity and seasonal flow patterns particularly high flood events, may alter fish mitigation patterns for species reliant on these cues for upstream migration.</p> <p>Increased flow may also result in increased mortality of semi-aquatic species.</p>	<p>Freshwater habitat</p> <p>Fish</p> <p>Otter</p> <p>Water vole</p> <p>Bats</p> <p>Birds</p> <p>Features of sites designated for nature conservation</p>



Activity	Effect	Ecological features
<p>freshwater environment.</p>	<p>Killing or injury of fauna through the removal of occupied resting or breeding sites.</p> <p>Potential for reduction in sediment transport leading to alteration of downstream habitats and river habitat deposition features.</p> <p>Introduction or spread of invasive species through the spread or introduction of contaminated spoil.</p>	
<p>Changes to water abstraction, discharge, storage during construction activities.</p>	<p>Potential decrease in water quality parameters such as dissolved oxygen and biochemical oxygen and/or flows at discharge/abstraction point resulting in changes to freshwater vegetation communities and the fauna these support.</p> <p>Creation of flood storage areas offers opportunities for the creation of new wetland habitat areas.</p>	<p>Freshwater habitats</p> <p>Macrophytes</p> <p>Macroinvertebrates</p> <p>Fish</p> <p>Features of sites designated for nature conservation</p>
<p>Use of lighting for security purposes or to illuminate construction working areas within freshwater environment.</p>	<p>Sensitive species may actively avoid sources of light disturbance and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.</p>	<p>Bats (various species)</p> <p>Otters</p> <p>Birds</p> <p>Badgers</p>
<p>Production of aural and visual stimuli and vibration from construction activities such as vehicular movements, piling or site personnel in the freshwater environment.</p>	<p>Behavioural avoidance of species from areas with high level of noise and/or vibration. Sensitive species may actively avoid these stimuli and search for alternative foraging habitats/commuting routes leading to a reduction in</p>	<p>Breeding and wintering birds</p> <p>Otters</p> <p>Bats (various species)</p> <p>Badgers</p>

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Activity	Effect	Ecological features
	the distribution of these species within suitable habitats and/or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.	Features of sites designated for nature conservation
Construction/alteration of drainage to facilitate works in the freshwater environment.	Alteration to hydrology including surface water connections resulting in areas becoming wetter or drier, leading to changes to vegetation communities and the species these support.	Terrestrial and freshwater habitats Associated flora and fauna Features of sites designated for nature conservation
Use of chemicals (e.g. fuels, solvents etc.) and liberation of pollutants and fine material through excavation, demolition or stockpiling or surface water flows during rainfall events	The introduction of toxic pollutants or sediments into the environment resulting in changes, loss or damage to terrestrial or freshwater environments and the fauna they support.	Terrestrial and freshwater habitats Associated flora and fauna Features of sites designated for nature conservation
Deposition of nitrogen and sulphur from engine exhaust during use of vehicles and generator sets within the construction area.	Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive HPAs, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support.	Terrestrial and freshwater habitats Associated flora and fauna Features of sites designated for nature conservation
Deposition of nitrogen and sulphur from engine exhaust from construction vehicle movements using the public highway.	Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive HPAs, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support.	Terrestrial and freshwater habitats Associated flora and fauna Features of sites designated for nature conservation
Increase in vehicle movements and changes in movement patterns and timings during construction activities.	Potential killing or injury of fauna through road traffic collisions.	Otter Badger



Activity	Effect	Ecological features
		Bats Birds
Recruitment of workforce leading to local population increase during construction phase with associated production of aural and visual stimuli.	Fauna sensitive to human presence may actively avoid sources of human disturbance and search for alternative habitats leading to a reduction in the distribution of these species within suitable habitats and /or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.	Breeding and wintering birds Otters Features of sites designated for nature conservation
Operation		
Deposition of nitrogen and sulphur from engine exhaust during aircraft traffic movements – take-off and landing	Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive terrestrial HPis, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support. The accumulation of nitrogen levels in water may result in the build-up of algal blooms and subsequent changes in vegetation community.	Terrestrial and freshwater habitats Associated flora and fauna Features of sites designated for nature conservation
Production of aural and visual stimuli and vibration produced by departing/arriving aircraft.	Behavioural avoidance of species from areas with high level of noise and/or vibration. Sensitive species may actively avoid these stimuli and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats and/or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival	Breeding and wintering birds Features of sites designated for nature conservation



Activity	Effect	Ecological features
	and productivity rates.	
Collision with birds (i.e. bird strike) during aircraft traffic movements – take-off and landing	Death or injury of individual birds.	Birds Features of sites designated for nature conservation
Production of aural and visual stimuli due to noise and vibration and movement during land based activities in support of airport operation (including presence of workforce, use of vehicles, cargo loading, plane maintenance, airfield management (not including bird scaring devices). management of waste etc.)	Behavioural avoidance of species from areas with high level of noise and/or vibration. Sensitive species may actively avoid these stimuli and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats and/or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.	Breeding and wintering birds Bats (various) Otters Badgers Features of sites designated for nature conservation
Deposition of oxides of nitrogen and sulphur from engine exhausts from land based activities in support of airport operation (including presence of workforce, use of vehicles, management of waste etc.)	Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive terrestrial HPis, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support. The accumulation of nitrogen levels in water may result in the build-up of algal blooms and subsequent changes in vegetation community.	Terrestrial and freshwater habitats Associated flora and fauna Features of sites designated for nature conservation
Use of lighting for security purposes or to illuminate operational working areas.	Disturbance and displacement of fauna sensitive to lighting resulting in indirect loss of foraging and commuting habitat or resting or breeding sites. Disruption of the physiology of species reliant on natural day/night and seasonal light level changes resulting in loss of	Bats (various species) Otters Birds



Activity	Effect	Ecological features
	<p>fitness and reduction in survival rates.</p> <p>Loss of ecological connectivity through severance (due to introduction of light) of habitats resulting in fragmentation.</p>	
<p>Use of bird scaring devices or use of bird deterrents (e.g. pyrotechnics, distress call broadcast etc.) for the management of bird strike risk</p>	<p>Behavioural avoidance of species from areas with high level of noise and/or vibration. Sensitive species may actively avoid these stimuli and search for alternative foraging habitats/commuting routes leading to a reduction in the distribution of these species within suitable habitats and/or resulting in a reduction of energy intake and/or an increase in energy expenditure potentially leading to a reduction in survival and productivity rates.</p>	<p>Birds</p> <p>Otters</p> <p>Bats</p> <p>Features of sites designated for nature conservation</p>
<p>Loss of pollutants from airport hard standings due to surface water flows during rainfall events related to management of surface water run-off and mobile pollutants (e.g. fuels and lubricants)</p>	<p>The introduction of toxic pollutants or sediments in to the environment resulting in changes, loss or damage to terrestrial or freshwater environments and the fauna they support.</p>	<p>Terrestrial and freshwater habitats</p> <p>Associated flora and fauna</p> <p>Features of sites designated for nature conservation</p>
<p>Deposition of nitrogen and sulphur from engine exhaust from vehicular traffic accessing/egressing the Airport</p>	<p>Deposition of nitrogen or sulphur from vehicle emissions resulting in enrichment and/or acidification of sensitive terrestrial HPis, including those contained within statutory designated sites, leading to alteration of vegetation communities through changes in baseline conditions and the species which they support.</p> <p>The accumulation of nitrogen levels in water may result in the build-up of algal blooms and subsequent changes in vegetation community.</p>	<p>Terrestrial and freshwater habitats</p> <p>Associated flora and fauna</p> <p>Features of sites designated for nature conservation</p>



Activity	Effect	Ecological features
Vehicle movements and changes in movement patterns and timings.	Potential killing or injury of fauna through road traffic collisions.	Otter Badger Bats Birds
Provision of biodiversity habitats within the wider landscape around Heathrow through the establishment and management of the green infrastructure approach.	Positive increase in biodiversity value through creation and management of suitable habitats.	Terrestrial and freshwater habitats Associated flora and fauna

6.8 Effects not requiring assessment

6.8.1 All likely significant effects identified will be considered at further stages of the assessment as more detail regarding the design becomes available and greater levels of baseline data are collected and analysed. No aspects or matters are being scoped out at this stage, other than those for ecological features deemed to be of local or negligible importance only (Table 6.11). These ecological features are being scoped out as any effects upon them would not be ‘significant’ in EIA terms (refer to paragraph 6.9.11). A further process to narrow the breadth of the assessment following the determination of the final design will be undertaken as described in paragraphs 6.9.5 – 6.9.11, as is standard practice within Ecological Impact Assessment (EclA).

Table 6.11 Potential effects to be scoped out of the biodiversity assessment

Activity	Effect	Receptor	Justification for scoping out
All activities described in Table 6.10.	Adverse effects, including cumulative effects	Ecological features of local or negligible importance only.	Ecological features of local or negligible importance support limited biodiversity interest, all of which is common and widespread. Negative effects are accounted for through use of a biodiversity offsetting metric (refer to paragraph 6.9.11).



6.9 Proposed approach to the assessment

- 6.9.1 The study area set out in Section 6.4: Study area will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed. Therefore, the study area may evolve as appropriate. The evolution of the study area (and the identification of likely significant effects within it), the reasons driving such changes and the measures taken to ensure a comprehensive baseline is collected and a robust assessment is undertaken (including the need for and results of desk and field surveys) will be discussed with Natural England and other relevant stakeholders.
- 6.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Additional baseline information required

- 6.9.3 The baseline data for the biodiversity assessment will be augmented in 2018 through the provision of further field survey data (including in areas where land access was not available in 2017), updated desk study information and inputs from other technical disciplines (e.g. surface and ground water modelling outputs, arboriculture survey information on the distribution and number of veteran trees, construction phasing information etc.). Further data collection may also be required in 2019 to answer specific questions raised by stakeholders, in response to matters raised in statutory consultation, or to fill in gaps associated with delayed land access.

Assessment years

- 6.9.4 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the biodiversity assessment specifically.
- 6.9.5 The EclA baseline will be informed by the desk study and field survey data when considered in the light of any predictable changes in the character of the study area and the flora and fauna present within it. When determining the baseline particular focus will be provided to:
1. Land uses subject to large-scale change (e.g. consented restoration plans for sand / gravel extraction or capped landfill sites, alterations to designated sites through the implementation of management plans etc.)
 2. Trends in species population size and distribution



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3. Ecological processes, such as succession (i.e. the natural change in habitat types over time)
4. Environmental trends (e.g. climate change).

6.9.6 For the construction phase of the DCO Project the majority of likely significant effects will be considered on the basis of the worst case scenario (corresponding to year of maximum construction effects as described in paragraph 4.3.5). This approach will remove the need to consider multiple assessment years within the construction phase for the majority of likely effects. For example habitat loss of a particular habitat type will be assessed as occurring simultaneously (i.e. the loss of a particular habitat will be considered to occur at the beginning of the construction phase). However, other likely effects will have the assessment years determined through liaison with other technical disciplines. For example likely effects associated with nitrogen deposition will be based on the scenarios described within air quality modelling (**Chapter 5: Air quality and odour**) which will account for both the construction phase and the changes during the operational phase due to changes in passenger numbers and air transport movements (ATMs), as the newly expanded Airport moves towards capacity.

Ecological Impact Assessment

- 6.9.7 The approach to the assessment of biodiversity will follow the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* (2016) produced by the Chartered Institute of Ecology and Environmental Management (CIEEM). The exceptions to this are the scoping out of ecological features that are of local or negligible importance (refer to paragraph 6.8.1) and a deviation from the suggested structure of the assessment provided in the guidance.
- 6.9.8 The likely significant effects arising from the DCO Project will continue to be identified through the on-going design process and finalised prior to DCO application. This exercise will identify the likely significant effects associated with the DCO Project, their extent and the importance of the ecological features that may be affected.
- 6.9.9 The importance of the ecological features, at the DCO Project level, will be determined based on the geographic scale described in Table 6.12³⁶. The importance of the ecological features will be described in relation to UK legislation and policy (e.g. SPIs in England are, in general, nationally important) and with regard to the extent of habitat or size of population within the vicinity of the DCO Project (e.g. a very small population of an SPI that may be affected by the DCO

³⁶ The exception to this will be bat populations that will have their importance determined with reference to Wray *et al.* (2010).



Project, even one that is declining, that is common and widespread such as house sparrow is not of national importance). Wherever possible, information regarding the extent and population size, population trends and distribution of the ecological features will be used, alongside the approach described in Table 6.12, to determine importance at the DCO Project level. Where detailed criteria are not available professional judgement will be used to determine importance. A justification of all determinations of importance will be provided to ensure transparency.

Table 6.112 Importance of habitats/species populations at the DCO Project level

Geographic context of Importance	Examples
<p>International or European</p>	<ol style="list-style-type: none"> 1. European sites including SPAs, SACs, candidate SACs and Sites of Community Importance (SCI); these sites are collectively referred to as Natura 2000 sites. Potential SPAs (pSPA), possible SACs (pSACs), Ramsar sites and proposed Ramsar sites should also be considered in the same manner in accordance with national planning policy. 2. Areas which meet the published selection criteria based on field data collected for the DCO Project, and in agreement with Natural England for designation as a European site or Ramsar site for either or both habitats and species, but which are not themselves currently designated at this level.
<p>National</p>	<ol style="list-style-type: none"> 1. A nationally designated site including SSSIs and National Nature Reserves (NNRs) 2. Areas (and the populations of species which inhabit them³⁷) which meet the published selection criteria guidelines for selection of biological SSSIs but which are not themselves designated³⁸ based on field data collected for the DCO Project, and in agreement with Natural England 3. Areas of Ancient Woodland e.g. woodland listed within the Ancient Woodland Inventory

³⁷ Habitats and species identified on various lists including Annex I of Council Directive 79/409/EEC on the conservation of wild birds, Annex I and II of Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna, Schedules 1 & 5 of the Wildlife & Countryside Act, HPI and SPI, Birds of Conservation Concern (BoCC) Red List, Red Data Book species are determined important at the level of the DCO Project based on selection criteria, at the international, national, county and borough level as opposed to legislation or policy level.

³⁸ Should discrete locations within the study area be identified as meeting qualification criteria the ecological feature in question will be valued at that level in all locations identified.



Geographic context of Importance	Examples
Regional (south-east)	<ol style="list-style-type: none"> 1. The South East Biodiversity Strategy³⁹ and Draft London Environment Strategy⁴⁰ provide information on habitats at a regional scale. Habitats of regional importance will be determined for this DCO Project based on the targets set in these documents 2. Regularly occurring populations of SPI will be considered to be of regional importance in the context of published information on population size and distribution⁴¹
County/Metropolitan (Greater London, Buckinghamshire, Berkshire, Surrey)	<ol style="list-style-type: none"> 1. LNRs and Non-Statutory Designated sites including: LWSs, SINC of Metropolitan Importance, SNCI and, BNSs designated in the county/metropolitan context⁴² 2. Areas which meet the published selection criteria⁴³ for those sites listed above but which are not themselves designated as such⁴⁴ based on field data collected for the DCO Project 3. Veteran and aged trees
Borough (local authority boundaries: South Buck, Slough, Windsor and Maidenhead, Hillingdon, Hounslow, Spelthorne)	<ol style="list-style-type: none"> 1. Designated sites: SINC designated in the sub-county (Borough or Local level) area context 2. Areas of habitats or populations of species which meet the published selection criteria for those sites listed above⁴⁵ based on field data collected for the DCO Project
Local	<ol style="list-style-type: none"> 1. Habitats and species that, based on the criteria above, are not categorised at a greater level of importance based on their extent, population size, quality etc. 2. Other common and widespread habitats and species
Negligible	<ol style="list-style-type: none"> 1. Areas of heavily modified or managed land uses (e.g. hard standing used for car parking, as roads etc.)

³⁹ The South East Biodiversity Strategy was archived in 2009. However, targets were set for habitats for delivery in 2015. This strategy provides a regional overview of habitat types and extents in the south-east (excluding Greater London) that is not replicated elsewhere.

⁴⁰ Greater London Authority, London Environment Strategy draft for public consultation, August 2017

⁴¹ An example of published information on population size and distribution would be the National Otter Survey (data for the sixth national survey are currently being compiled).

⁴² In the Greater London area SINC are designated at three levels according to their geographic importance: Sites of Metropolitan, Borough (Grade I), Borough (Grade II) and Local Importance and will be considered important accordingly.

⁴³ Locally agreed criteria guidance including Gibbs, C (2008) Guidance for the Selection of Sites of Nature Conservation Importance (SNCIs) in Surrey; Criteria for the Selection of Local Wildlife Sites in Berkshire, Buckinghamshire and Oxfordshire; The London Wildlife Site Board (LWSB) (2013) Process for Selecting and confirming Sites of Importance for Nature Conservation (SINC) in Greater London.

⁴⁴ The lowest qualification criteria for a particular habitat or species within the total of the guidance documents will be used to ensure a precautionary approach to determination of importance.

⁴⁵ This will draw on professional judgement and established criteria (where available) for the selection of the borough level wildlife sites, in consultation with local consultees to provide guidance on examples of good, standard and poor quality habitats within each borough. To consider habitats that characterise the area i.e. areas of habitat identified in the appropriate Natural Area Profile (or equivalent) and with consideration of the relevant borough and the needs of neighbouring boroughs.



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- 6.9.10 Assigning a level of importance to populations of bat species will follow Wray *et al* (2010), as requested by Natural England. The geographic frame of reference described in Table 6.12 (with the exception of Borough) will be maintained but the criteria and approach used to determine importance will differ. The status of the species, species distribution and the diversity and abundance of species recorded during baseline surveys will be considered when determining importance (refer to **Appendix 6.3: Determining the importance of bats**).
- 6.9.11 All ecological features that are determined to be important at a local level only, except those receiving specific legal protection⁴⁶ will be scoped out (allowing for cumulative changes associated with other developments that are already built, are under construction or are likely to be constructed) of the assessment at this stage as a significant effect in EIA terms could not occur (refer to paragraph 6.8.1). Further, the use of a biodiversity offsetting metric (Section 6.10) ensures that any residual negative effects on these ecological features are accounted for in a measurable and transparent way, with the aim of achieving an overall result of a net gain in biodiversity (**Appendix 6.4: Biodiversity offsetting strategy – delivering biodiversity net gain for the DCO Project: approach to the calculation of biodiversity losses and gains**).
- 6.9.12 In order to further define the scope of the assessment, it is essential to determine whether the DCO Project is capable of resulting in likely significant effects on the ecological features identified following determination of importance. In order to identify likely significant effects all the activities associated with the construction and operation of the DCO Project will be considered. Through defining the activity and its related environmental effect, it is possible to identify potential ecological features that may be subject to likely significant effects. Key to establishing a likely significant effect is the determination of a Zone of Influence (Zol) for each ecological feature (i.e. the area within which a likely significant effect associated with the DCO Project may be identified). Zols differ depending on the type of effect and the ecological feature being considered. Zols will be determined for this DCO Project through a review of published evidence (e.g. disturbance criteria for various species, hydrological effects of infrastructure on surrounding habitats etc.) and professional judgement where necessary.
- 6.9.13 Following the determination of both the important ecological features and likely effects that require further assessment, it is necessary to determine the likely significance of these effects upon them. CIEEM (2016) defines a significant effect

⁴⁶ Species receiving specific legal protection will be included in the assessment where a potential effect is identified, regardless of importance on the geographical scale. The EclA will determine whether there could be a breach of the legislation and describe any mitigation required to ensure that the law will not be contravened.



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as one “*that either supports or undermines biodiversity conservation objectives for ‘important ecological features’⁴⁷ or for biodiversity in general*”.

- 6.9.14 When considering likely negative or positive effects on ecological features, the following characteristics will be taken into account:
1. Extent – the spatial or geographical area over which the effect may occur
 2. Magnitude – the size, amount, intensity or volume of the likely effect being considered
 3. Duration – the length of time over which the likely effect may occur
 4. Frequency and timing – the number of times a likely effect is predicted to occur and how long the effect is likely to last
 5. Reversibility – whether the likely effect on an ecological feature can be reversed through restoration actions.
- 6.9.15 The assessment of the likely significant effects on each ecological feature will be presented holistically to ensure transparency with reference to the characteristics described in paragraph 6.9.14, both with and without any proposed mitigation to deal with residual effects. In order to demonstrate that the stepped process described in CIEEM 2016 has been followed, a summary table will be provided. The final conclusions drawn will either be a determination of a ‘significant effect’ or a ‘not significant effect’ to reflect the EIA Regulations.
- 6.9.16 As part of the EclA a cumulative effects assessment will be undertaken based on CIEEM 2016 and the approach described in Section 4.6 of **Chapter 4: Approach to EIA Scoping** of this Scoping Report.

Habitats Regulations Assessment

- 6.9.17 The Secretary of State for Transport will be required to undertake a HRA of the Project. The HRA is a staged process that is described in the Planning Inspectorate’s Advice Note Ten Habitats Regulations Assessment relevant to Nationally significant infrastructure projects as:
1. **Stage 1 - Screening:** Screening for Likely Significant Effects (LSE). Stage 1 sets out which European sites may experience LSE and which potential effects can be screened out. The European sites identified at the screening stage as potentially experiencing LSE will be taken forward to Stage 2 (Appropriate Assessment)

⁴⁷ For this DCO Project this does not include ecological features deemed to be of Local or Negligible importance.



2. **Stage 2 - Appropriate Assessment:** If Stage 1 identifies LSE, it is necessary to assess the implications of the DCO Project on the affected site(s)' conservation objectives
3. **Stage 3 - Assessment of alternatives:** A consideration of alternative solutions is required if it cannot be concluded that there will be no adverse effect on the integrity of the affected European site(s)
4. **Stage 4 - Consideration of IROPI:** If there are no alternative solutions, an Assessment of Imperative Reasons of Overriding Public Interest (IROPI) is required.

6.9.18 In order to facilitate the Secretary of State in making their decision, Heathrow are required to provide the information required for an assessment to take place. The information to be provided by Heathrow will follow that outlined in Advice Note Ten.

6.9.19 The Evidence Plan process (described in Section 6.3) will determine the type of information necessary to inform a robust assessment and the approaches used to consider the evidence gathered.

6.10 Approach to mitigation and compensation

6.10.1 The mitigation hierarchy will be applied to biodiversity⁴⁸ to ensure designs first seek to avoid significant harm (embedded mitigation as described in Section 4.2: Approach to identifying likely significant effects), to mitigate (additional mitigation as described in Section 4.2) where it is unavoidable, and, as a last resort, to compensate for residual effects that remain after avoidance and mitigation measures are implemented. The avoidance of significant harm is being considered through the design process. Within the design process, potential mitigation measures associated with conservation notable and legally protected flora and fauna are being actively considered. These measures include determining the extent and distribution of suitable habitats required within the DCO Project and in the wider surrounds to account for the likely effects on legally protected (e.g. reptiles, bats etc.) and other conservation notable species, the types of habitats that they may require and how these can be incorporated within developing green infrastructure designs. As more information becomes available from the ongoing field survey programme and as the DCO Project design and construction phasing plans develop mitigation plans will evolve.

6.10.2 Aside from the requirement to ensure legal compliance with relevant wildlife legislation and to reduce or avoid the potential for likely significant negative effects (in EIA terms), Heathrow have developed a biodiversity offsetting strategy to

⁴⁸ Defra, Biodiversity Offsetting Pilots – Guidance for developers, 2012



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ensure that the final outcome of the DCO Project, with regard to biodiversity, is a net gain. The use of a biodiversity offsetting metric (based on Defra guidance) provides a transparent and measurable way to account for the losses and gains associated with the DCO Project. Although the use of this metric does not include the detailed design of mitigation measures (this being considered within the EclA and HRA with regard to biodiversity), it encourages a holistic approach to project design and mitigation/compensation design that makes a positive contribution to local biodiversity.

- 6.10.3 The use of a biodiversity offsetting metric within the context of a DCO Project seeking to deliver biodiversity net gain, will be a quantitative output that enables stakeholders to determine how losses have been measured, how these losses have been compensated for and the extent of the biodiversity net gain being delivered. **Appendix 6.4** describes Heathrow's approach to delivering net biodiversity gain. This approach has been formally agreed as appropriate with Natural England and the Environment Agency.



Chapter 7

Carbon and other greenhouse gases



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7. CARBON AND OTHER GREENHOUSE GASES

7.1 Introduction

7.1.1 This chapter describes the scope of the assessment as it relates to carbon dioxide and other greenhouse gas (GHG) emissions, often referred to collectively as ‘carbon’ in government and guidance documents. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.

7.1.2 This chapter describes:

1. The carbon and other GHG emissions policy and legislative context
2. Topic specific stakeholder engagement so far and future proposed engagement
3. The study area for the assessment
4. Sources of data used for scoping
5. Baseline conditions, including current desk studies and surveys
6. Likely significant effects of the DCO Project on carbon and other GHG emissions
7. Effects not requiring assessment
8. The proposed approach to the assessment
9. Approach to mitigation.

7.1.3 Heathrow’s emissions will be reported in terms of carbon dioxide emissions (CO₂) and separately also as GHG emissions¹. This will align the assessment with Heathrow’s annual sustainability performance report and the Airports Commission report, which both present emissions in terms of CO₂, and is also consistent with advice from the Department for Transport (DfT) and Committee on Climate Change (CCC) which require emissions from aircraft to be reported as CO₂ only². Heathrow’s emissions will also be reported in terms of GHGs (except for aircraft) to facilitate contextualisation with UK national or sector-specific carbon budgets which are typically reported in million tonnes of GHG emissions (MtCO₂e).

¹ GHG emissions are determined by the Kyoto Protocol (1997) to include seven gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride and nitrogen trifluoride. To provide consistent reporting of these gases, each is weighted by its global warming potential and converted to a carbon dioxide equivalent (CO₂e).

² See Section 7.9 (Operational emissions) for further details



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7.1.4 The GHG assessment will focus on both direct and indirect emissions associated with the DCO Project. Construction and operational impacts extend beyond the physical boundary of the proposed scheme to include surface access, flights and manufacturing emissions for example.

7.2 Policy and legislation

7.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 7: Carbon and other greenhouse gas emissions**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.

7.2.2 The policy and legislation relevant to the carbon and other GHGs assessment methodology are detailed in Table 7.1.

Table 7.1 Key policy and legislation relevant to the assessment of carbon and other greenhouse gases

Relevant policy / legislation	Relevance to the assessment
Policy – International	
Intergovernmental Panel on Climate Change (IPCC)	In 2014 the Intergovernmental Panel on Climate Change (IPCC) published its Fifth Assessment Report (AR5) Synthesis Report ³ , further reinforcing its statement that human influence on climate change is clear and growing. Climate change is the largest inter-related cumulative environmental effect which has the potential to lead to significant environmental effects on a wide range of areas (population, fauna, soil, temperature change, rising sea level, etc.). The IPCC's AR5 highlights that the risks associated with climate change can be limited as long as global temperature increase is stabilised to below 2 degrees Celsius relative to pre-industrial levels. The IPCC and AR5 Synthesis Report provides robust evidence that climate change poses a global risk, and underpins the international response in terms of setting carbon budgets which will be used to contextualize Heathrow expansion GHG emissions.
United Nations Framework Convention on Climate Change (UNFCCC)	The UNFCCC was created in 1992 with the aim of tackling climate change through international negotiation and cooperation. Countries that sign the UNFCCC are referred to as 'Parties' and meet annually at the Conference of Parties (COP).

³ Intergovernmental Panel on Climate Change (IPCC), Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2014

http://ar5-syr.ipcc.ch/topic_summary.php (accessed 02 May 2018)



Relevant policy / legislation	Relevance to the assessment
	<p>The Kyoto Protocol⁴ was adopted in 1997 (the 3rd COP), setting legally binding limits on GHG emissions for all Parties. The Protocol’s first commitment period began in 2008 and ended in 2012. It is under this first period that the UK Climate Change Act was adopted in 2008. The second commitment period began on 1st January 2013 and will end in 2020. There are now 197 Parties to the UNFCCC and 192 Parties to the Kyoto Protocol.</p> <p>In 2015, at COP 21, the Paris Agreement⁵ was adopted, with the aim to strengthen the global response to climate change by limiting global temperature increase this century to below 2 degrees Celsius above pre-industrial levels, and pursue efforts to limits temperature increase even further to below 1.5 degrees Celsius. To achieve this aim the Paris Agreement additionally sets a target for net zero⁶ global carbon emissions in the second half of this century. The Paris Agreement came into force in November 2016.</p> <p>According to the Committee on Climate Change (CCC) the UK’s carbon budget (aligned to meet the UK’s Climate Change Act target of an 80% reduction by 2050) is demanding and already a positive contribution to global climate action. The implications of the Paris Agreement on UK carbon budgets will be reviewed at a later date by Government.</p> <p>Heathrow’s impact on the UK’s ability to meet its climate change obligations will be tested against the Climate Change Act and the CCC’s carbon budgets.</p>
<p>ICAO CORSIA (Carbon Offsetting Reduction Scheme for International Aviation)</p>	<p>The International Civil Aviation Organization (ICAO) is the international body responsible for environmental standards relating to aviation activity globally, including policy relating to aviation’s global carbon emissions. As such ICAO is a delegated body responsible for addressing requirements of the UNFCCC and international climate agreements such as the Paris Agreement. In October 2016 ICAO announced that it had reached agreement across its 191 Member States on the introduction of a global market based emissions offsetting scheme. The agreement, known as CORSIA (Carbon Offsetting Reduction Scheme for International Aviation) is a world first in terms of reaching an agreement for carbon emission reduction for any international sector and is fully supported by Heathrow and the UK government, which is a member of ICAO. CORSIA aims to offset any growth in carbon emissions from international aviation after 2020 that fall within the scope of the scheme. It will be implemented over two phases, starting with a pilot phase from 2021 until 2023, followed by two phases of implementation until 2035 by when at least 90% of international aviation activity will come under the scheme. Growth in emissions above those in 2020 will be offset by airlines purchasing emissions reduction credits, which they will then be required to submit to</p>

⁴ United Nations, Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1998

⁵ United Nations, Paris Agreement, 2015

⁶ Net zero means “a balance between anthropogenic emissions by sources and removals by sinks of carbon emissions in the second half of this century”. Article 4, paragraph 1 of the Paris Agreement.



Relevant policy / legislation	Relevance to the assessment
	<p>the government of the country in which the flight originated. The assessment will consider the implications of Heathrow airlines participation in CORSIA and the effect of offsetting growth from a 2020 baseline.</p>
<p>Policy – UK</p>	
<p>Revised draft Airports National Policy Statement (revised draft ANPS)⁷</p>	<p>The revised draft ANPS provides a basis for decision making on development consent applications for the DCO Project. It describes Government policy for the expansion of aviation capacity in the South-East of England, and confirms the North-West Runway (NWR) at Heathrow as the Government's preferred scheme.</p> <p>The revised draft ANPS requires the applicant's assessment to include:</p> <ol style="list-style-type: none"> 1. Increase emissions from air transport movements (both international and domestic) as a result of increased demand (paragraph 5.73) 2. Emissions from airport buildings and ground operations (paragraph 5.73) 3. Emissions from surface transport accessing the expanded airport (paragraph 5.73) 4. Emissions caused by construction (paragraph 5.73) 5. Assessment of any likely significant climate factors (paragraph 5.75) 6. Evidence of the carbon impact of the project (including embodied carbon), both for construction and operation (paragraph 5.75) 7. Assessment against the Governments carbon obligations, including but not limited to carbon budgets (paragraph 5.75) 8. Quantification of the GHG impacts before and after mitigation to show the impacts of the proposed mitigation (paragraph 5.75) 9. Reporting of GHG emissions split into traded sector and non-traded sector emissions (paragraph 5.75) 10. Separate reporting of international and domestic aviation GHG emissions (paragraph 5.75) 11. Quantification of the carbon impacts of both a 'do minimum' and also a 'do something' scenario for the opening, peak operation, and worst case scenarios for: <ul style="list-style-type: none"> • Emissions from surface access due to airport and construction staff • Emissions from surface access due to freight and retail operations and construction site traffic • Emissions from surface access due to airport passengers / visitors • Emissions from airport operations including energy and fuel use (paragraph 5.76)

⁷ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant policy / legislation	Relevance to the assessment
	<p>Paragraph 5.81 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”.</p> <p>Paragraph 5.82 states that “The Secretary of State’s view of the adequacy of the mitigation measures relating to design, construction and operational phases will be a material factor in the decision making process”.</p> <p>The scope of the GHG assessment presented within this chapter complies with the requirements of the revised draft ANPS.</p>
<p>National Networks National Policy Statement (NN NPS)⁸</p>	<p>The NN NPS provides planning guidance for promoters of nationally significant infrastructure projects on the road and rail networks, recognising the transport sector’s role in meeting the Government’s legally binding carbon targets.</p> <p>The NN NPS states that any increase in carbon emissions is not a reason to refuse development consent, unless the increase in carbon emissions is large enough to have a material impact on the ability of the Government to meet its carbon reduction targets (similar position as the revised draft ANPS on GHG emissions). It also sets out the requirement to present appropriate mitigation measures for both design and construction, ensuring the carbon footprint of the project is not unnecessarily high.</p> <p>The assessment will report on GHG emissions associated with surface access transport (unmitigated and mitigated), and see how these emissions align with the Government’s carbon budgets.</p>
<p>National Planning Policy Framework (NPPF)⁹</p>	<p>The NPPF (March 2012) advises on and supports the transition to a low carbon future and provides guidance on climate change mitigation and GHG emissions reduction. It does not contain specific policies for nationally significant infrastructure projects and therefore should be read in conjunction with the relevant policies. The NPPF Draft text for consultation (March 2018)¹⁰ will in due course replace the first NPPF (March 2012). Within the context of the assessment the draft does not provide any materially different or additional requirements.</p>

⁸ Department for Transport, National Policy Statement for National Networks, 2014

⁹ Department for Communities & Local Government, National Planning Policy Framework, 2012

¹⁰ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft text for Consultation, 2018



Relevant policy / legislation	Relevance to the assessment
<p>UK Aviation Policy Framework (APF) March 2013</p>	<p>The Aviation Policy Framework sets out the Government's plan that will allow the UK aviation sector to continue to grow and make significant contributions to the economy. With respect to climate change the Government's objective is to ensure that the aviation sector makes a significant and cost-effective contribution towards reducing global emissions. Specifically on international aviation and CO₂ emissions the policy framework states that: "<i>Our emphasis is on action at a global level as the best means of securing our objective, with action within Europe the next best option and a potential step towards wider international agreement.</i>"</p> <p>The Government is planning to develop a new UK Aviation Strategy looking to shape the future of aviation to 2050 and beyond.</p> <p>The UK APF reinforces the existing policy measures that should be considered at a national level, such as the Climate Change Act 2008, which informs this assessment.</p>
<p>Legislation – International</p>	
<p>EU Emission Trading Scheme (ETS)</p>	<p>The EU ETS¹¹ is a tool used for reducing carbon emissions. It is a cap-and-trade mechanism whereby a total amount of allowable annual carbon emissions from electricity generation, large energy-intensive industries has been agreed at the EU level. The coverage of EU ETS was extended in 2012 to include aviation carbon emissions from flights to and from EU countries. Following legal challenge to its application to non-EU carriers, it has been temporarily amended to only include flights within EU countries. The assessment will consider the implications of existing EU ETS policy on traded and non-traded GHG emissions from the DCO Project.</p>
<p>Legislation – UK</p>	
<p>Climate Change Act 2008</p>	<p>The Climate Change Act 2008 sets the basis for the UK's approach to tackling climate change. A GHG reduction target of 80% by 2050 in comparison to the 1990 baseline is set, whilst the Committee on Climate Change (CCC) provides advice and establishes carbon budgets to achieve this target. Both the revised draft ANPS and NN NPS state that any increase in GHG emissions alone is not a reason to refuse development consent, unless the increase in emissions is significant enough to materially impact the UK's ability to meet its carbon reduction targets.</p> <p>The assessment will test how GHG emissions from the DCO Project align with the UK's carbon budgets and climate change obligations.</p> <p>International aviation CO₂ emissions are presently excluded from UK carbon budgets. The CCC have recommended that a carbon allowance is made in UK carbon budgets equalling 37.5 MtCO₂ for international and domestic aviation and this has implicitly been included for approved carbon budgets to 2032 (5th Carbon budget). Government is yet to decide</p>

¹¹ European Commission, EU Emissions Trading System https://ec.europa.eu/clima/policies/ets_en (accessed 02 May 2018)



Relevant policy / legislation	Relevance to the assessment
	if it wishes to accept CCC advice and explicitly include an allowance for UK aviation in carbon budgets.
The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (EIA Regulations)	<p>The EIA Regulations require the following matters to be included in an Environmental Statement in relation to climate change and GHG emissions:</p> <ul style="list-style-type: none"> • Regulation 5(2)(c): “<i>The EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of the proposed development on land, soil, water, air and climate</i>” • Schedule 4, Regulation 1(d): “<i>an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operational phases</i>”. • Schedule 4, Regulation 4: “<i>a description of the factors ... likely to be significantly affected by the development: ... climate (for example greenhouse gas emissions...).</i>” • Schedule 4, Regulation 5(f): “<i>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.</i>”

7.2.3 Due regard will also be given to local policies and the Government’s 25 year environment plan¹² where they are relevant.

7.3 Stakeholder engagement

7.3.1 Engagement undertaken to date and proposed future engagement is set out in Table 7.2.

Table 7.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Environment Agency	<p>The scope of the GHG assessment was presented to the Environment Agency on 23 April 2018. The presentation covered the following elements:</p> <ol style="list-style-type: none"> 1. Why are GHG emissions important and the legal/ policy background to climate change? 2. Baseline GHG conditions for Heathrow 3. Data sources that inform the GHG assessment 4. The proposed approach to the GHG assessment and scenarios 	<p>Future engagement will be carried out as and when required</p>

¹² HM Government. A Green Future: Our 25 Year Plan to Improve the Environment, 2018.



Consultee	Engagement undertaken to date	Proposed future engagement
	5. Scope of the assessment 6. How will significance be assessed? 7. How will we test if Heathrow's emissions align with the UK's wider climate change obligations (carbon budgets)? No specific feedback or comments were provided.	
Heathrow Strategic Planning Group (HSPG)¹³	The scope of the GHG assessment was presented to the HSPG on 10 th May 2018. The presentation covered the same elements presented above to the Environment Agency.	Future engagement will be carried out as and when required

7.4 Study area

- 7.4.1 The study area for the GHG emissions assessment is defined by the likely location of the sources of emissions associated with the construction and the operation of the DCO Project and by GHG emitting activities that enable and arise from this.
- 7.4.2 GHG emissions associated with the DCO Project fall into four areas, as defined by paragraph 5.76 of the revised draft ANPS:
1. Emissions from surface access due to airport and construction staff
 2. Emissions from surface access due to freight and retail operations and construction site traffic
 3. Emissions from surface access due to airport passengers / visitors
 4. Emissions from airport operations including energy and fuel use.
- 7.4.3 Surface transport GHG emissions are further detailed in paragraph 5.76 of the revised draft ANPS (see Table 7.1). GHG emissions from these activities will occur both within and beyond the Airport's boundary.
- 7.4.4 For further detail on DCO Project scope of the GHG assessment see Section 7.7: Likely significant effects requiring assessment.

¹³ The membership of the HSPG is set out in Section 4.9: Engagement



7.5 Sources of data used in scoping

Desk study

- 7.5.1 The relevant policy and legislation presented in Section 7.2: Policy and legislation, combined with key data sources presented in Table 7.3, were used to inform this scoping chapter.

Table 7.3 Data sources used for scoping

Source	Relevance to the assessment
Airports Commission: Final Report, July 2015¹⁴	<p>The Airports Commission was set up to explore options in addressing aviation capacity, it shortlisted and assessed three options (Gatwick, Heathrow Northwest and Heathrow Extended Northern Runway). The Commission concluded that a new Northwest Runway presents the strongest case.</p> <p>The Final Report informs the scope and methodology of the GHG assessment.</p>
Appraisal of Sustainability (AoS): revised draft Airports National Policy Statement, main report, 2017⁷	<p>The AoS provides information on the economic, social and environmental effects of schemes to increase aviation capacity, it also informs the revised draft ANPS.</p> <p>The AoS informs the significance assessment methodology.</p>
Heathrow 2.0, Our Plan for Sustainable Growth, 2017¹⁵	<p>Sustainability strategy for Heathrow.</p> <p>Heathrow 2.0 provides strategy and commitments which are used as a basis for mitigation measures.</p>
Committee on Climate Change (CCC), Meeting the UK aviation target – options for reducing emissions to 2050, December 2009¹⁶	<p>The CCC provides advice on UK aviation emissions limits and targets, concluding that there is potential for aviation demand to increase while still meeting the Government's 2050 emissions reduction target.</p> <p>The report presents carbon reduction trajectories for the aviation sector that align with the UK's climate change obligations along with mitigation measures.</p>
Department for Transport, UK aviation forecasts 2017, October 2017¹⁷	<p>The DfT provides forecasts for 2050 aviation carbon emissions for the North West Runway that the DCO Project will deliver.</p> <p>The document provides information on projected UK aviation GHG emissions, by airport, put to 2050. It will be used as a comparison for projected emissions.</p>

¹⁴ Airports Commission: Final Report, July 2015

¹⁵ Heathrow, Heathrow 2.0 Our plan for sustainable growth, 2017

¹⁶ Committee on Climate Change, Meeting the UK aviation target – options for reducing emissions to 2015, 2009

¹⁷ Department for Transport, UK Aviation Forecasts, 2017



7.6 Baseline conditions

- 7.6.1 The baseline year will be 2017 and this is chosen to assure alignment with Heathrow's latest available annual sustainability report at the time of assessment.
- 7.6.2 Annually Heathrow publishes a sustainability report in which GHG emissions associated with Airport activities are presented. This represents current baseline conditions under the two-runway (2R) Airport.
- 7.6.3 Heathrow's main emissions source is the aircraft landing and take-off (LTO) cycle (57%), followed by passenger surface travel (24%) and airport electricity and fuel consumption (10%). A summary of this data for indicative purposes presented in Table 7.4 for 2015 and 2016¹⁸.

Table 7.4 Heathrow carbon emissions performance by activity in 2015 and 2016

Activity	2015 (tonnes CO ₂)	2016 (tonnes CO ₂)
Flights (landing and take-off (LTO) cycle)	1,251,180	1,290,339
Surface access (passenger travel)	566,293	543,367
Airport electricity and utilities fuel consumption (HAL and third party)	263,430	225,761
Surface access (staff travel)	148,860	146,977
Airport vehicles (HAL and third party)	38,718	37,796
Other	1,050	1,458
TOTAL EMISSIONS	2,269,531	2,245,698

- 7.6.4 Table 7.4 details the scope of emissions that Heathrow can manage and influence most directly and therefore excludes CO₂ emissions from the cruise element of flights. The latest UK Aviation Forecasts¹⁷ report that flight CO₂ emissions (LTO and cruise phases) from Heathrow were 19.5¹⁹ million tonnes in 2016.

7.7 Likely significant effects requiring assessment

- 7.7.1 The scope of the assessment will be split into two main components from where GHG emission sources occur: construction and operation.

¹⁸ Heathrow Airport Limited, Heathrow 2.0 – Detailed Review of Sustainability Progress in 2017, 2018

¹⁹ Excludes contribution from ground APUs, freighters and residual correction which are only available at a national level.

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- 7.7.2 Operational activities are further divided into emissions relating to air transport, surface access transport and airport buildings and operations. This reflects the categories defined in the revised draft ANPS (paragraph 5.73).
- 7.7.3 Descriptions of relevant activities and their scope as it applies to the DCO Project and the assessment are provided in Table 7.5. The table shows that the GHG emissions assessment is not defined nor limited to specific geographical boundaries; rather it includes emission sources of both a direct and in-direct nature; and follows an approach that reflects the DCO Project and the nature of activities that follow from it.
- 7.7.4 Construction will be considered from “cradle-to-completed-construction”. This is the sum of GHG emissions covering extraction of raw and primary materials and their manufacture and refinement into products and construction materials. This will also include associated transport and supply logistics and construction site works GHG emissions.

Table 7.5 Likely significant carbon and other GHG effects for assessment

Activity	Effect
Construction	
The manufacture and production of construction materials	The manufacturing of construction materials (including concrete and steel etc.). This includes the extraction / mining resources and any primary and secondary processing or manufacturing. As there will be many new assets and changes to existing assets, there will be corresponding indirect GHG emissions.
Construction material and worker transportation and logistics	Vehicles used for the delivery of construction materials to site and removal of construction waste. This includes construction staff travel as well. This will likely use vehicles with internal combustion engines and therefore also lead to GHG emissions.
Construction site works	The operation of on-site plant and equipment during construction and demolition of assets. Construction plant will be required to undertake the demolition and construction works, including excavators, cranes and other equipment. There will also be the need for temporary accommodation, lighting and power. These activities will consume energy and/or water and consequently lead to GHG emissions.
Operation	
Air transport: this covers the GHG emissions from both domestic and international flights: including emissions from aircraft in the air and those associated with their movement and operation on the ground.	
Cruise (one way)	Emissions associated with flights occur due to the consumption and burn of aircraft fuel. Fuel use differs between aircraft types and throughout the
Landing and take-off cycle	



Activity	Effect
	different phases of a flight and ground movement (e.g. landing, take-off, cruise and auxiliary power units (APU) use).
Surface access transport: is the movement of people and freight to and from the Airport	
Airport staff and contractor access	Airport staff, contractor, visitor, passenger and freight movements will occur as a result of the DCO Project. GHG emissions associated with surface access will depend on the number of transport movements and the mixture of transport modes (road and rail access) used over time.
Passenger and visitor access	
Freight movements	
Airport buildings and ground operations: include GHG emissions arising due to the day to day operation of the airport (for example emissions from electricity use in the Airport terminal and the fuel combustion of airside operational vehicles).	
Airport operations	GHG emissions from water, energy (e.g. electricity and fuel, etc.), material and product consumption, waste, and in some cases operational processes (i.e. refrigerant leakage) associated with the DCO Project.
Maintenance activities	GHG emissions from energy, fuel and materials consumption in the future maintenance and refurbishment of Project infrastructure and buildings. This includes energy and fuel consumed within Airport buildings associated with aircraft maintenance at the airport. Water demand and waste arisings might also be accounted for here.

7.8 Effects not requiring assessment

- 7.8.1 At this stage of the DCO Project's development, no climate change effects have been scoped out of the assessment.

7.9 Proposed approach to the assessment

- 7.9.1 The GHG emitting activities associated with the construction and operation of the Project are set out in Section 7.4: Study area. These will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed.
- 7.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Assessment temporal scope

- 7.9.3 The overall approach to determining the assessment years that is used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment



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years presented in this section have been determined for the purposes of the GHG emissions assessment specifically.

- 7.9.4 The temporal scope of the assessment will be 2021 to 2050. This temporal scope covers both the construction and operational phases of the DCO Project.
- 7.9.5 2050 is considered a reasonable end comparison point for the assessment since it reflects the point in time to which relevant Government policies on carbon reduction have forecast carbon budgets (see Table 7.1 regarding the Climate Change Act and the revised draft ANPS).
- 7.9.6 Within the temporal scope of the GHG assessment there are a number of important time points (years) for which it will be necessary to report and consider emissions. These are:
1. Peak construction – the year of construction with greatest GHG emissions (construction is expected to begin in 2021)
 2. Early air traffic movements (ATMs) – the release of additional capacity (increase from 480,000 to up to 505,000 ATMs) under the existing airport layout prior the opening of the new runway
 3. Year of opening – assumed to be 2026, known as Year 1 of operation
 4. Peak operation – this will include the year of maximum passenger numbers (to reflect surface access emissions) as well as the year of maximum ATMs (to reflect emissions from aircraft)
 5. Year of predicted maximum environmental effects – the year with the highest estimated GHG emissions to reflect the ‘worst-case scenario’ (note that this may not be the same as the year of peak operation)
- 7.9.7 The year of peak construction and peak operation will be determined and reported in the Environmental Statement once the GHG assessment is complete.

Assessment scenarios

- 7.9.8 To meet the requirements of the revised draft ANPS the GHG emissions assessment will evaluate a number of scenarios for the DCO Project. These will be time series based and reflect 2R and 3R scenarios.
- 7.9.9 Paragraph 5.76 of the revised draft ANPS requires an assessment of the ‘do minimum’ and ‘do something’ scenarios for the opening, peak operation and worst-case scenarios. These scenarios will report construction and operational, and flight and non-flight GHG emissions. The scenarios are:

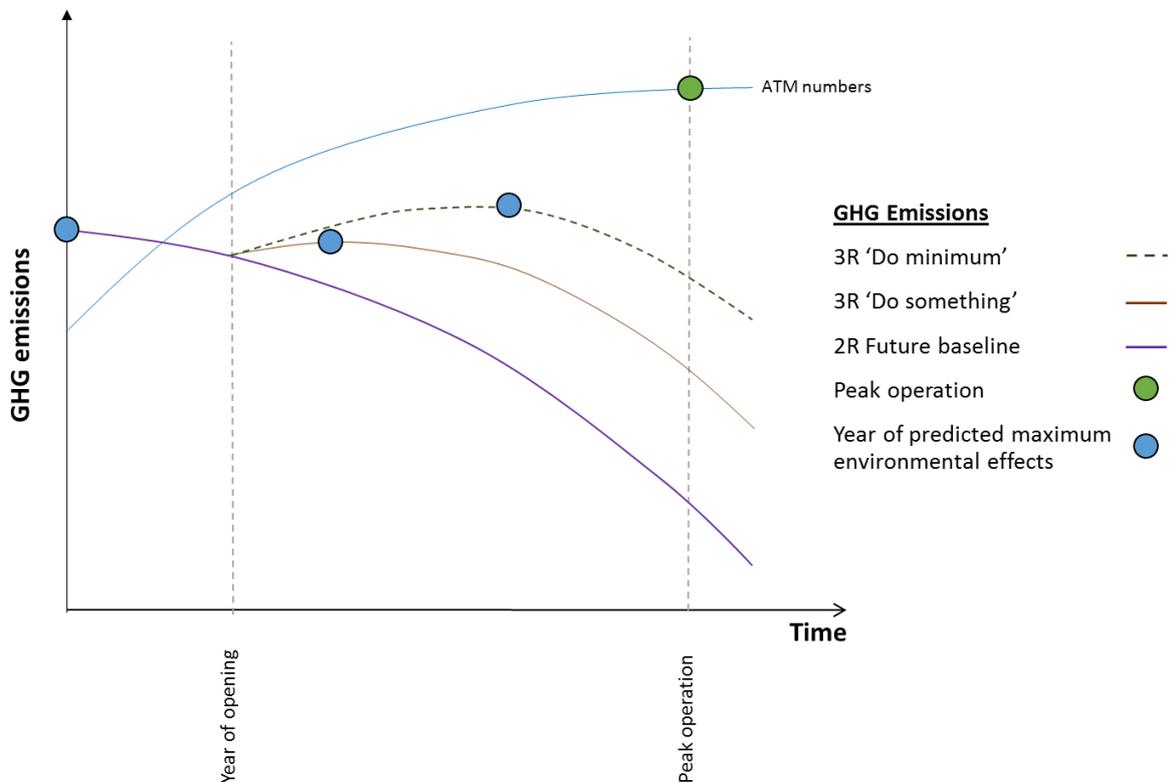


1. **2R future baseline** – the two-runway Airport and its continued future operation allowing for future improvements. The 2R scenario will factor in future improvements for example:
 - a. Low carbon energy provision from the grid
 - b. New asset construction
 - c. Maintenance works
 - d. SAS vehicle improvements and electrification
 - e. Technology improvements associated with existing and new aircraft types
2. **Project (3R) ‘do minimum’ scenario** – based on the preferred three-runway design and its operational plans. This will include standard embedded mitigations across both construction and operational sources.
3. **Project (3R) ‘do something’ scenario** – this is the three-runway Airport and operational approach that Heathrow expects to realise with the DCO Project. This would include the best practice mitigations, such as those set out in paragraphs 5.77, 5.78 and 5.79 of the revised draft ANPS.

7.9.10 Graphic 7.1 provides a conceptual illustration of Project 2R and 3R scenarios indicative of potential future GHG emissions projections. This is set alongside a profile of possible future ATMs. The 3R GHG projections show an initial increase in emissions immediately following the opening of the DCO Project to account for the additional flights, followed by a levelling off and decrease in GHG emissions. The decrease in GHG emissions assumes improvements in the aviation sector such as aircraft engine fuel consumption efficiencies, the adoption of biofuels or improved airspace design.



Graphic 7.1 Conceptual illustration of the GHG emission assessment scenarios²⁰



7.9.11 For each assessment scenario, GHG emissions will be estimated for each year in the 2021 to 2050 temporal scope. In addition, an aggregate gross GHG emissions estimate will also be determined for each assessment scenario which will be the sum of each annual GHG emission estimate between 2021 and study end-point in 2050.

GHG emissions estimation

7.9.12 Bespoke approaches will be taken to estimating the GHG emissions from Project construction and operation and the separate flight and non-flight elements of these scopes.

7.9.13 The assessment will be guided by and undertaken to align with relevant third party GHG assessment methodologies. These include:

1. PAS 2080:2016 Carbon Management in Infrastructure and BS EN 15978:2011 Sustainability of construction works, Assessment of environmental

²⁰ Graphic 7.1 conceptually presents ATM numbers because the majority of emissions are expected to be driven from flights (see Section 7.6 Baseline). It is acknowledged that certain GHG emissions will be driven by passenger numbers which do not follow a similar curve to that of ATMs. Certain GHG emissions are independent to both ATMs and passenger numbers, such as construction emissions, which occur at a point in time.



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performance of buildings, have been used to inform the approach to non-flight emissions estimation

2. The IEMA Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance (2017) includes detail on proportionate and robust assessment and has been used to inform the approach to non-flight emissions estimation
3. The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GHG Protocol) Provides standards and guidance for preparing a GHG emissions inventory and has been used to inform the approach to non-flight emissions estimation
4. The EMEP/EEA Air Pollutant Emission Inventory Guidebook: 2016 (formerly known as Corinair) provides guidance and data for the calculation of flight emissions over the cruise and LTO phases and has been used to inform the approach to flight emissions estimation.

7.9.14 Data feeding into the GHG assessment will be sourced from a wide variety of sources. This includes, but is not limited to, government sources published by DfT and BEIS, carbon databases (such as the Inventory of Carbon & Energy²¹), industry guidance (such as the RICS standard on carbon assessments for the built environment²²) and information from design and engineering teams. The temporal scope of the GHG assessment extends to 2050 and whereby assumptions need to be made on issues such as: what the UK's future road fleet mix will look like, at what rate the UK grid electricity will be decarbonised or how much more efficient planes will be. There is an inherent level of uncertainty with future projections, but the GHG assessment will ensure that the most relevant and complete data available is used, and that any assumptions adopted to address data gaps will be clearly recorded.

Construction emissions

- 7.9.15 Emissions associated with construction will be quantified for all the activities for which reasonable data or assumptions can be made. The GHG emissions calculations will use construction inventories data (for example the mass of concrete in a building structure, or the electricity consumed in construction works), and multiply these by appropriate emission factors to determine GHG emissions outturn.
- 7.9.16 The assessment will use GHG emission factors which best represent, and are as consistent as is practicable, with DCO Project construction plans and the scenarios being assessed. They will be chosen based on information available at

²¹ <http://www.circularecology.com/embodied-energy-and-carbon-footprint-database.html>

²² Whole life carbon assessment for the built environment – RICS Professional Statement, November 2017



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the time of assessment that defines this, such as Project design details, construction material choice, construction method strategies, and supply chain options.

- 7.9.17 Construction inventory data that will be used to inform the assessment includes:
1. Bill of quantities (e.g. mass, volume and area of construction material)
 2. Descriptive information on the size and number of assets proposed (e.g. number of terminals, floor area of commercial space or number of car parking spaces)
 3. Number of vehicle trips delivering construction material to site (logistics)
 4. kWh energy use by plant equipment
 5. Construction programme which will indicate duration of activities.

Operation emissions

Flight emissions

- 7.9.18 The calculation of aircraft CO₂ emissions will draw on the forecasts of ATMs for the DCO Project and data on emission factors by aircraft type, as detailed in the EMEP guidebook. Emission factors for future aircraft types not included in the EMEP guidebook will be developed based on a review of literature and best available guidance on performance of future aircraft types.
- 7.9.19 The assessment will also take into account efficiency improvements related to likely future operational changes (for example increased use of single engine taxiing and ground-towing) as well as take up of sustainable aviation biofuel within the Heathrow fleet and airspace, and navigational reform.
- 7.9.20 The penetration of biofuel in the fleet, the life cycle benefits of biofuel, and take up and effectiveness of operational improvements will be modelled based on review of the literature and best available guidance.
- 7.9.21 For flights, only CO₂ emissions will be reported. This is consistent with advice from the CCC^{23, 16} and the DfT¹⁷.
- 7.9.22 There is currently no internationally agreed way of allocating international aviation CO₂ emissions to individual countries. However, the United Nations Framework Convention on Climate Change (the UNFCCC) do provide a recommended approach which is to allocate departure emissions to the country of departure. This convention is adopted by the UK government in the reporting of UK international emissions and has been adopted by the CCC in its advice to government. It is

²³ Committee on Climate Change, Scope of carbon budgets – Statutory advice on inclusion of international aviation and shipping, April 2012



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proposed therefore to adopt this convention for the assessment of CO₂ emissions for international flights for the purposes of identifying the significant likely effects of the DCO Project and its consistency with government climate obligations.

- 7.9.23 It is recognised that the DCO Project will equally result in additional CO₂ emissions from arrival flights however it is for decision makers in the origin country to put in place measures to control emission from those flights consistent with climate obligations agreed through the UNFCCC and ICAO.

Surface access emissions

- 7.9.24 Surface access (transport) will be quantified for all the activities for which reasonable data or assumptions can be made.
- 7.9.25 For those emissions that can be quantified, the calculations will take an amount of activity (for example tonne or passenger kilometres travelled) and multiply this by an appropriate emission factor reflecting the mode of travel.
- 7.9.26 Emissions factors will be selected which best represent the available knowledge at the time of the assessment and, where appropriate, will represent the predicted emission rates for the year of the assessment including future efficiencies and modal shift (i.e. future transport emissions will depend on changes in travel mode [car, bus, rail, underground] and improvements in transport efficiency over time).

Airport buildings and ground operations emissions

- 7.9.27 Operational emissions will be quantified for all the activities for which reasonable data or assumptions can be made.
- 7.9.28 The calculations will take an amount of activity (for example, total electricity consumed or waste generated) and multiply this by an appropriate emission factor.
- 7.9.29 Emissions factors which best represent the available knowledge at the time of the assessment will be selected and, where appropriate, will represent the predicted emission rates for the year of the assessment considered. For example, the carbon intensity of UK grid electricity (gCO₂e/kWh) will depend on the projected rate of decarbonisation over time.

Additional baseline information required

- 7.9.30 As described in Section 7.4: Study area, should the study area change in response to the evolving design, the need for any additional baseline data for carbon and other GHG emissions may be reviewed and updated.
- 7.9.31 Current baseline data does not report on (non-aviation) freight transport related emissions associated with the goods and services provided at Heathrow, nor does it include construction and maintenance activities. Freight transport carbon



emissions will rely on the transport modelling assessment carried out by the transport team, whilst construction and maintenance GHG emissions will be derived from Heathrow's annual expenditure data.

Significant effects

- 7.9.32 There currently is no defined threshold of GHG emissions which, if exceeded, can be defined as significant or potentially significant. A bespoke approach to determining significance is proposed based on the following steps:
1. The difference in GHG emissions (cumulatively over the assessment period 2021 – 2050) will be assessed twice, between
 - a. the 2R future baseline and 3R 'do minimum' scenario
 - b. the 2R future baseline and 3R 'do something' scenario.
 2. The difference in GHG emissions between the 2R future baseline and 3R scenarios will be presented as a total for all sources, and separately for the GHG sources as defined in Table 7.5 (construction, air transport, surface access transport, and airport buildings and ground operations).
 3. Whether the difference in GHG emissions between scenarios is significant will be judged on a qualitative basis by reference to the nature and magnitude of emissions, whether they are temporary or permanent, and the probability of their occurring. The criteria used to determine significance is consistent with the requirements of Schedule 4 of the EIA Regulations and includes: any direct effects and any indirect, secondary, cumulative, short-term, medium-term and long-term effects, both positive and negative. The combined description of impacts for each of the criteria listed above will be considered, and using professional judgement, significance will be determined. The approach to transboundary effects is explained in paragraph 7.9.53 below.
- 7.9.33 The proposed approach and criteria to determining significance are similar to those adopted by the AoS supporting the revised draft ANPS, but adapted to meet the requirements of the EIA Regulations. It is also considered to be consistent with guidance by IEMA²⁴.

Alignment with UK climate change and carbon budgets

- 7.9.34 Although the AoS of the revised draft ANPS has concluded that the all three schemes (including the NWR scheme) will result in a 'significant negative effect', it also concludes that the scheme (the NWR was one of three studied in the AoS), "*could still be delivered consistent with the UK's carbon commitments*" (paragraph

²⁴ Institute of Environmental Management and Assessment, Assessing Greenhouse Gas Emissions and Evaluating their Significance



9.12.16 of Appendix A-9). Hence the test as to whether the DCO Project will hinder the UK's ability to meet its climate change obligations is separate to the significance assessment.

7.9.35 The Climate Change Act requires that UK carbon emissions in 2050 are reduced to at least 80% below 1990 levels. This legislation sets the framework for the UK's carbon commitments. To date, five carbon budgets have been legislated, the latest being the fifth carbon budget (see Table 7.6). The carbon budgets set the required reduction in emissions, and in doing so also set the trajectory the UK should adopt in order to meet the requirements of the Climate Change Act.

Table 7.6 The UK's carbon budgets set by the CCC (MtCO_{2e})

	1	2	3	4	5		
UK Carbon Budgets	2008 -	2013 -	2018 -	2023 -	2028 -	2033 -	2050
	12	17	22	27	32	50	Target
Cumulative emissions (MtCO_{2e})	3,018	2,782	2,544	1,950	1,725²⁵	TBC	167

7.9.36 In order to determine whether the DCO Project's GHG emissions materially impact the UK's ability to meet its carbon reduction targets, including carbon budgets, the following methodology is proposed:

1. The difference (i.e. increase) in GHG emissions between the 2R future baseline scenario and the 3R 'Do minimum' and 'Do something' scenarios will be calculated and compared against relevant UK carbon budgets
2. The comparison will be made to the third, fourth and fifth UK carbon budgets as well as to the 2050 carbon target (the CCC has not yet set budgets for the period 2032 to 2049).

7.9.37 The UK carbon budgets set by the CCC can be met through a mixture of measures, such as: the uptake of electric vehicles, grid electricity decarbonisation, installing wall insulation in homes, and efficiencies in the agriculture sector, for example. There is no single prescriptive path to reducing UK GHG emissions on the path to 2050.

7.9.38 The CCC's central scenario is the most cost-effective path to meeting the requirements under the Climate Change Act, and includes specific policy measures under each of the following sectors: power, industry, buildings, transport, agriculture and land use change, waste and fluorinated gases. Where

²⁵ Based on the latest accounting basis and excludes GHG emissions from international shipping and aviation



possible different elements of the DCO Project's GHG assessment (construction, air transport, surface access transport, airport buildings and ground operations) will also be compared against relevant sectors, following the methodology described in paragraph 7.9.36.

Surface access transport, airport buildings GHG emissions

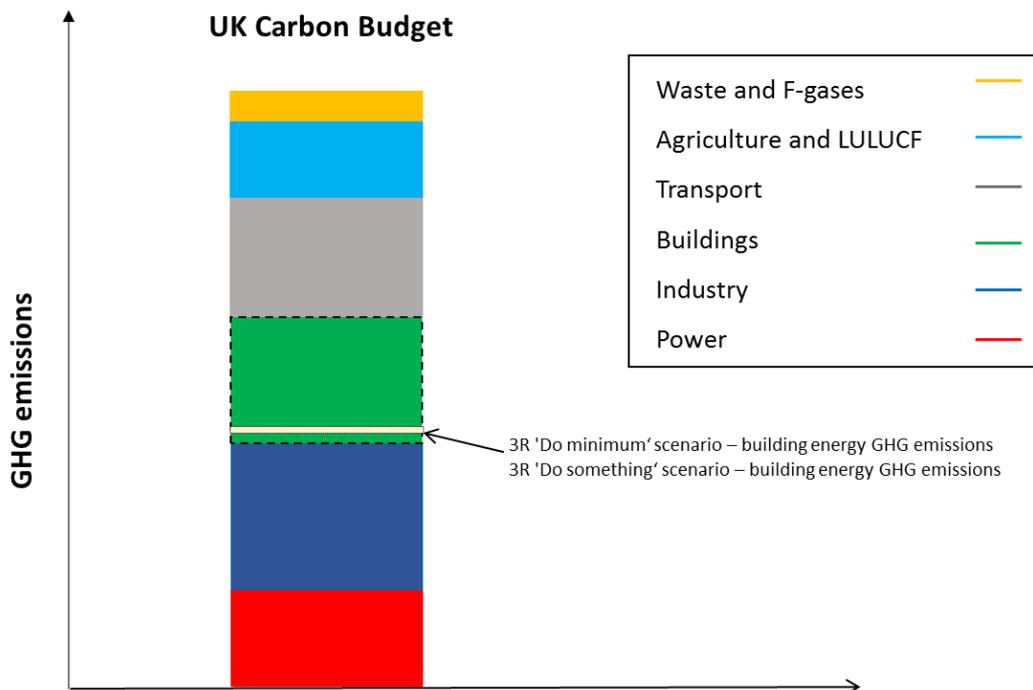
- 7.9.39 The DCO Project's surface access transport and airport buildings GHG emissions will be compared against the UK's transport and building sector respectively. This is on the basis that the scope of activities that fall within these elements of the assessment (see Table 7.5) broadly align with the CCC's transport and building sector.
- 7.9.40 The UK transport sector includes: car travel, vans, heavy goods vehicles (HGVs), bus, motorcycle and rail. These are similar modes of transport associated with day-to-day operation of Heathrow and thus this is a sensible comparison.
- 7.9.41 With regards to the DCO Project's building operation GHG emissions, these will be compared against the non-residential element of the UK's building sector. The UK building sector includes GHG emissions associated with the heating, lighting and operation of 'commercial' buildings, similar activities to those associate with operating a terminal. The comparison exercise will exclude emissions from the DCO Project's ground operations, such as vehicle fuel use, as this does not align with the CCC's building sector.
- 7.9.42 Graphic 7.2 conceptually illustrates the UK's carbon budget broken down by sector including the buildings and transport sectors.
- 7.9.43 The assessment of alignment of the DCO Project's building emissions with UK carbon budgets will compare the DCO Project's building emissions (for the budget period) with the building sector total. A similar comparison will be carried out between surface access transport emissions and the transport sector total.

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Graphic 7.2 Indicative alignment comparison of Project's building GHG emissions with UK carbon budget and building sector



Construction phase GHG emissions

- 7.9.44 The UK Green Construction Board (UK GCB) Low Carbon Routemap²⁶ will be used to compare the DCO Project's construction emissions as there is no clearly defined 'construction' sector under the CCC.
- 7.9.45 The scope of the UK GCB Low Carbon Routemap is wide. It includes both construction and operational GHG emissions for the domestic, non-domestic and infrastructure sectors. The DCO Project's construction GHG emissions will be compared to the infrastructure and non-domestic construction emissions sectors within the UK GCB's routemap. This is because construction work planned for the DCO Project includes upgrades to the local road network, river diversions and public utilities (which falls neatly under the infrastructure sector) as well as building terminal and supporting facilities which are considered part of the non-domestic sector.
- 7.9.46 Alignment with UK climate change obligations will be dealt with using the same methodology as with surface access transport and airport buildings elements (see paragraphs 7.9.39 to 7.9.43 and Graphic 7.2).

²⁶ <https://www.greenconstructionboard.org/index.php/resources/routemap>



Air transport

7.9.47 The revised draft ANPS considers the implications of its support for a NWR option on the government's ability to meet its climate change obligations in terms of CO₂ emissions from flights associated with the project. On the basis of assessment carried out by the Airports Commission and subsequently updated through supplementary analysis completed by the DfT²⁷, the revised draft ANPS concludes that;

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

7.9.48 The revised draft ANPS has therefore concluded in paragraph 3.67 that the NWR can be delivered within the UK's carbon obligations.

7.9.49 Table 7.1 sets out the key policy and legislation that applies to GHG emissions. Specifically in terms of aviation emissions the position is that:

1. International aviation emissions are excluded from the UK's climate change budgets
2. Government policy is to seek to manage international aviation emissions through international agreements, such as for example the recent ICAO agreement to stabilise international emissions from 2020 through the CORSIA agreement
3. Domestic aviation is included within the UK budgets
4. Government will consider further the advice from the CCC on treatment of international aviation in the forthcoming Aviation Strategy

7.9.50 The assessment carried out for the DCO Project on alignment of the DCO Project's aviation emissions with UK carbon budgets will therefore be focused on comparing domestic aviation emissions from Heathrow to domestic aviation emissions.

7.9.51 In the absence of an agreed domestic aviation carbon budget the assessment will therefore examine any change in domestic aviation emissions from Heathrow against most up-to-date Government reported domestic emissions, as detailed in Table 7.7.

²⁷ Department for Transport. Updated Appraisal Report Airport Capacity in the South East, 2017 and Department for Transport. Carbon Abatement in UK Aviation, Final Report, October 2017.

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Table 7.7 Total UK domestic departing aircraft emissions (MtCO₂) forecasts assuming NWR option

Year	Domestic aviation MtCO ₂ with NWR		
	Low	Central	High
2015	1.51	1.51	1.51
2020	1.53	1.56	1.62
2030	1.79	1.84	1.88
2040	1.66	1.73	1.78
2050	1.63	1.76	1.83

Cumulative effects

7.9.52 Cumulative carbon and other greenhouse gases effects resulting from the combination of effects from the DCO Project and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

Transboundary effects

7.9.53 In relation to carbon, GHG emissions impact on the global atmosphere which in turn can give rise to a range of climate change effects that are experienced globally. However, it is not possible to apportion or identify any impact of an increase (or any particular level of increase) in GHG emissions in terms of environmental effects on any particular country or state. In particular, there will not be a significant effect on the environment of any EEA State or group of EEA States resulting from carbon emissions from the DCO Project, since the environmental receptor in this regard is the global atmosphere, rather than the environment of any country or state or group of countries or states. For further detail on transboundary effects refer to Section 4.8: Transboundary effects.

7.10 Approach to mitigation

7.10.1 This section should be read in conjunction with **Chapter 4: Approach to EIA scoping** which sets out further definition for the DCO Project regarding embedded measures, additional mitigation and standard practice mitigation.

7.10.2 The revised draft ANPS identifies that the Secretary of State will need to be satisfied that the mitigation measures put forward for the DCO Project are acceptable. To facilitate this requirement the GHG emissions assessment will consider mitigation measures for both the construction and operational phases of



the DCO Project, and it will determine the scale of reduction in GHG emissions that are likely to be achieved by such measures.

- 7.10.3 The scale of reduction will be determined by comparing the ‘do minimum’ scenario (which includes standard embedded mitigations), and the ‘do something’ scenario (that includes best practice mitigations); as per the definitions set out in paragraph 7.9.9. The ‘do something’ scenario is intended to reflect the mitigation that Heathrow proposed to adopt. The assessment and identification of mitigation measures will consider, although not be limited to, those set out in paragraphs 5.77, 5.78 and 5.79 of the revised draft ANPS. The ‘do something’ scenario will include best practice mitigations, and will meet the requirements of the revised draft ANPS.
- 7.10.4 The Heathrow expansion consultation document²⁸ provides further details of the type and nature of mitigations measures under consideration and which are expected to be included in the ‘do something’ scenario. These are aimed at realising the development of a Project that has imbedded lower-carbon outcomes.
- 7.10.5 Mitigation measures are expected to be secured through mechanisms such as:
1. Project engineering and architectural requirements which set out low carbon objectives for masterplan, asset utilisation, material and resource productivity, and construction programming and approach
 2. Surface access and traffic management plan
 3. Draft Code of Construction Practice
- 7.10.6 Further detail in relation to mitigation measures and how they might best be secured will develop as the project evolves and will be documented in the Environmental Statement and other documents submitted with the application. Associated mitigations will be secured through a set of requirements that will be included in the DCO.

Residual effects

- 7.10.7 The three-runway airport and operational approach that Heathrow expects to realise with the DCO Project is defined by the DCO Project (3R) ‘do something’ scenario. The GHG emissions estimate calculated and reported for this scenario will represent the residual GHG emissions effects of the DCO Project.

²⁸ Heathrow, Our Approach to Carbon and Climate Change – Airport Expansion and Consultation, January 2018



Chapter 8

Climate change



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8. CLIMATE CHANGE

8.1 Introduction

- 8.1.1 This chapter describes the scope of the assessment as it relates to climate change, considering both the positive and negative effects. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 8.1.2 This chapter describes:
1. The climate change policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. Study areas for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant in-combination climate change effects of the DCO Project and likely significant climate change resilience effects on the DCO Project
 7. Effects not requiring assessment
 8. The proposed approach to the assessments
 9. Approach to mitigation.
- 8.1.3 This chapter describes data and information relevant to two assessments, specifically the in-combination climate change impacts (ICCI) assessment and the climate change resilience (CCR) assessment. The ICCI assessment focusses on those effects of the DCO Project identified by an environmental topic which will also be affected by climate change (for example an impact identified by biodiversity topic which could be affected by projected changes in temperature). The CCR assessment focusses on the resilience of the DCO Project over its lifetime to projected future climate change effects. Where data and information is common to both assessments it is presented as such. Where data and information is specific to each assessment, separate sub-headings are used.
- 8.1.4 The scope of the climate change topic has overlaps with aspects of the major accidents and disasters topic and water environment topic. **Chapter 15: Major accidents and disasters** includes consideration of the role of climate change in affecting the frequency and severity of major accident and disaster events. **Chapter 18: Water environment** includes consideration of the impact of future



climate change on the water environment through, for example, increased high intensity short duration rainfall events.

8.2 Policy and legislation

- 8.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 8: Climate change**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.
- 8.2.2 The policy and legislation relevant to the climate change assessment methodology is detailed in Table 8.1.

Table 8.1 Policy and legislation relevant to the climate change assessments

Relevant policy / legislation	Relevance to assessment
Policy – UK	
<p>Revised draft Airports National Policy Statement (revised draft ANPS)¹</p>	<p>Climate Change is covered in section 4 of the revised draft ANPS, from paragraph 4.37 – 4.55. It is regarded as an “assessment principle”. Given the long-term nature of new airport infrastructure, it is a requirement upon the applicant to consider the impacts of climate change when planning design, build and operation, and set out in any accompanying Environmental Statement (ES) how the proposal will take into account the projected impacts of climate change.</p> <p>The latest available UK Climate Projections available must be taken into account (presently UKCP09, with UKCP18 due for release in November 2018).</p> <p>In addition, where infrastructure has safety-critical elements and an asset design life of 60 years or more, the UK Climate Projections high emissions scenario for the 2080s timeline should be used, considering 10%, 50% and 90% probability levels in order to ensure that high impact, low likelihood scenarios are included. This requirement on the specific emissions scenario and probability levels to be used when assessing the resilience of infrastructure are applicable to the CCR assessment and not to the ICCI assessment.</p> <p>The applicant should also demonstrate that there are no critical features of the infrastructure which may be seriously affected by more radical changes to the climate beyond those projected in the UK Climate Projections (based on latest credible scientific evidence on for example sea level rise).</p>

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant policy / legislation	Relevance to assessment
	<p>Any adaptation measures should be based on the latest set of UK Climate Projections, the most recent UK Climate Change Risk Assessment², consultation with statutory consultation bodies, and any other appropriate climate projection data. Any adaptation measures must themselves also be assessed as part of any Environmental Impact Assessment and included in the environmental statement, which should set out how and where such measures are proposed to be secured.</p> <p>If any proposed measures give rise to consequential impacts, the Secretary of State will consider the impact in relation to the application as a whole and the assessment principles set out in the revised draft ANPS.</p>
<p>National Policy Statement for National Networks (NN NPS)³</p>	<p>Similar to the revised draft ANPS, the National Policy Statement for National Networks sets out the need for applicants in the development of long-term infrastructure to consider the impacts of climate change, using the latest available UK Climate Projections data. Any accompanying Environment Statement should set out how the proposal will take account of projected impacts of climate change. Where infrastructure has safety-critical elements and the design life of the asset is 60 years or more, the UK Climate Projections high emissions scenario (high impact, low likelihood) for the 2080s timeline, 50% probability level, should be used.</p>
<p>National Planning Policy Framework (NPPF)⁴ and draft NPPF⁵</p>	<p>The NPPF sets out the Government’s planning policies for England and how these are expected to be applied.</p> <p>The NPPF sets out that Local Plans should take account of climate change over the longer term, including factors such as flood risk, coastal change, water supply and changes to biodiversity and landscape. New developments should be planned to avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable (e.g. to flooding), care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure.</p> <p>Local Planning Authorities should set out the strategic priorities for the area in the Local Plan, and this should include policies to deliver climate change mitigation and adaptation (among other priorities).</p>

² Department for Environment, Food & Rural Affairs, UK Climate Change Risk Assessment 2017, January 2017

³ Department for Transport, National Policy Statement for National Networks, 2014

⁴ Department for Communities & Local Government, National Planning Policy Framework, 2012

⁵ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018



Relevant policy / legislation	Relevance to assessment
	<p>The NPPF is in the process of being revised, the main difference in relation to climate being that the revised NPPF states that “plans should take a proactive approach to mitigating and adapting to climate change, within the context provided by the Climate Change Act 2008”, whereas previously the requirement was to be “<i>in line with objectives and provision of the 2008 Climate Change Act</i>”, which was a stronger link.</p>
<p>Aviation Policy Framework (APF)⁶</p>	<p>The APF provides the baseline for the Airports Commission to consider on issues such as aircraft noise and climate change.</p> <p>The APF states that the aviation industry will use the National Adaption Program⁷ to work with Government and other stakeholders to address climate risks. It emphasises the Government’s support for improving understanding and management of climate risks.</p>
<p>Legislation – UK</p>	
<p>UK Climate Change Act 2008⁸</p>	<p>The Climate Change Act 2008 forms parts of the UK government’s plan to reduce greenhouse gas emissions, committing the government to a reduction of GHGs by at least 80% from 1990 levels by 2050. The Act also introduced an Adaptation Reporting Power, under which the Secretary of State has the power to direct certain organisations to report on their preparedness in relation to climate change (their resilience to climate change). The Secretary of State directed a number of infrastructure owners and operators, including Heathrow, to report for the first round of reporting, and Heathrow voluntarily responded in the second round of reporting. This led to the development of the <i>Heathrow Airport climate change adaptation reporting power report⁹</i> which identified the key climate risks to the infrastructure and operations of the airport; and the <i>Climate change adaptation and resilience progress report¹⁰</i>, which reported on Heathrow’s progress in meeting resilience actions.</p> <p>The Climate Change Act also commits the UK to producing a Climate Change Risk Assessment at regular intervals. To date two CCRAs have been produced.</p>

⁶ The Stationary Office, Aviation Policy Framework, Presented to Parliament by the Secretary of State for Transport by Command of Her Majesty, March 2013

⁷ The National Adaptation Program is a five-year statutory programme setting actions to address climate change challenges. It sets out what Government, business and society are doing to enhance climate change resilience.

⁸ Department for Energy and Climate Change, The Climate Change Act 2008

⁹ Heathrow Airport Limited, Climate change adaptation reporting power report, May 2011

¹⁰ Heathrow Airport Limited, Climate change adaptation and resilience progress report, July 2016



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8.2.3 Due regard will also be given to local policies and the Government's 25 year environment plan¹¹

8.3 Stakeholder engagement

8.3.1 The engagement undertaken to date is set out in Table 8.2. Further engagement with the Heathrow Strategic Planning Group (HSPG)¹² is planned.

Table 8.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Environment Agency	<p>A meeting with the Environment Agency was held on the 23 April 2018. The aim was to inform the Environment Agency of the process being undertaken and receive comments on improvements or best practice. The Environment Agency have been engaged in the development of the climate change adaptation approach taken by the Water topic (Chapter 18: Water environment).</p> <p>The Environment Agency are content that the approach taken for non-water related climate change adaptation assessments for the DCO Project is adequate. The Environment Agency has previously approved the climate change approach taken with regards to the Water topic, with a focus on the Flood Risk Assessment (Appendix 18.4: Flood baseline definition, design standards and climate change). There were no recommendations to alter the approach to assessment following the meeting.</p>	<p>The Environment Agency will provide comments throughout the consultation process. The Environment Agency only has responsibility to the Government for ensuring climate change adaptation relating to water related aspects of schemes, and thus will focus on this area.</p>

8.4 Study areas

8.4.1 This section presents study areas for the ICCI and CCR assessments.

¹¹ HM Government. A Green Future: Our 25 Year Plan to Improve the Environment. 2018

¹² The membership of the HSPG is set out in Section 4.9: Engagement



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In-combination climate change impacts assessment

- 8.4.2 The study area for the ICCI assessment comprises the study area boundaries defined by each of the environmental topics (see relevant chapters of this Scoping Report, Chapters 5 to 18).
- 8.4.3 The most relevant 25km² UK Climate Projections 2009¹³ (UKCP09)¹⁴ grid square for the DCO Project provides the relevant climate data for the assessment. Where a receptor lies outside of this area, the relevant grid square within which it is located instead provides the source of current and future climate data required for the assessment.

Climate change resilience assessment

- 8.4.4 The study area for the CCR assessment comprises:
1. The land within the existing Airport boundary
 2. The land being considered for the DCO Project.
- 8.4.5 In most cases the relevant 25km² UKCP09 grid square for the DCO Project is the relevant source of data. Where land being considered for the DCO Project lies outside of this area, the relevant grid square within which it is located instead provides the source of current and future climate data required for the assessment.
- 8.4.6 As the design and consultation processes progress and the DCO Project is refined, the study areas for the ICCI and CCR assessments may continue to evolve to accommodate any changes that are generated. If the study areas change, data collection will also be reviewed and updated. Any changes to the study area for the ICCI assessment will be based on dialogue and the input from each of the environmental topics. Changes in the CCR assessment will be informed by changes on the extent of the land being considered for the DCO Project.

¹³ UK Climate Programme 2009 Using Climate Projections
<http://ukclimateprojections.metoffice.gov.uk/21678> (accessed 02 May 2018)

¹⁴ The full data interface for UKCP18 is anticipated to be made available in November 2018. UKCP18 will be used in the PEIR and final ES. See paragraph 8.9.4



8.5 Sources of data used in scoping

Desk study

- 8.5.1 For both assessments (ICCI and CCR), the main data sources of current and future climate data obtained for scoping and to be used in the assessments, are described in this section.
- 8.5.2 UKCP09 gridded observation data¹⁵ and UKCP09 climate change projection data for the UK is used for scoping. UKCP09 provides the best currently available climate change projection data for the UK and most appropriate data to be used in climate change resilience and adaptation studies. The climate change projection data is available for different emission scenarios, future time periods, and probability levels at a spatial resolution of 25km². Time periods available range from the 2020s (2010 – 2039) to the 2080s (2070 – 2099). Three main emissions scenarios are available: low, medium and high emissions. In line with the revised draft ANPS, given that the design life of the DCO Project is in excess of 60 years and has safety critical elements, the high emissions scenario, for the 2080s time period in UKCP09 will be used.
- 8.5.3 The Met Office observing weather station at Heathrow has been recording meteorological conditions since 1948. Hourly data records for temperature, precipitation and wind speed and direction from 1960 have been obtained. The weather station data will be used to complement the information from the gridded observation in UKCP09 for some variables (for example, wind). Heathrow was used to validate the outputs from UKCP09, more specifically the outputs of the Weather Generator¹⁶. The data published as part of the validation will also be used to inform the future baseline.
- 8.5.4 The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) global climate projection data is based on the outputs from the global climate models used in the Coupled Model Intercomparison Project Phase 5 (CMIP5)¹⁷ and represent the best available information at a global scale. These climate change projections are available for a set of emissions scenarios (informed by Representative Concentration Pathways), future time periods and different models (more than twenty global climate models are included in CMIP5). CMIP5

¹⁵ UKCP09: Gridded observation data sets

<https://www.metoffice.gov.uk/climatechange/science/monitoring/ukcp09/> (accessed 02 May 2018)

¹⁶ UKCP09, Validation of the Weather Generator outputs, March 2011

<http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87941&filetype=pdf> (accessed 02 May 2018)

¹⁷ CIMP5 - Coupled Model Intercomparison Project 5 - Overview <https://cmip.llnl.gov/cmip5/> (accessed 02 May 2018)



data will be considered alongside UKCP09 data for summer rainfall projections as recommended by the UKCP09¹⁸.

- 8.5.5 H++ scenarios publication¹⁹ defines ‘high-end’ scenarios (referred to as H++) to describe extreme climate change scenarios. H++ scenarios are typically beyond the 10th to 90th percentile range of the UKCP09 and CMIP5 projections. Scenarios have been developed for heat waves, cold snaps (referred to as Low minus minus (L- -) scenarios), low/high rainfall, low/high river flows and wind storms. H++ scenarios present plausible extreme risks but with low associated likelihoods. H++ scenarios were developed to enable more conservative planning. Clear guidance on how to use H++ scenarios is not available. However, they might be used to compare high impact low likelihood events against more likely outcomes and to identify and test the limits of adaptation measures.
- 8.5.6 Further details about these sources of data are provided in Section 8.6: Baseline conditions and in **Appendix 8.1: Current and future climate data**.

8.6 Baseline conditions

- 8.6.1 The baseline conditions for both the ICCI assessment and the CCR assessment refer to the current and the future climate. The following sub-sections summarise these two components of the baseline conditions. Further details are provided in **Appendix 8.1**.
- 8.6.2 The climate variables used to describe current and future climate at Heathrow and relevant to the DCO Project are temperature, precipitation, wind, lightning and fog. These climate variables can also lead to changes in extreme climate events (for example. floods, droughts, fire, soil moisture deficit, heatwaves, snow and ice). The information obtained on changes in the climate variables will be used to provide insight into future changes in extreme climate events.

Current climate baseline

- 8.6.3 The period 1961 to 1990 will be used to describe current climate and when comparing current and future climate. This is in agreement with the period used in UKCP09 for describing climate changes in the UK.
- 8.6.4 Heathrow has a temperate marine climate²⁰ with mild damp winters and warm, drier, sunnier summers, similar to much of the southern British Isles. Close to

¹⁸ UKCP09, Updating UKCP09 <http://ukclimateprojections.metoffice.gov.uk/24123> (accessed 02 May 2018)

¹⁹ Adaptation Sub-Committee, Developing H++ climate change scenarios for heat waves, droughts, floods, windstorms and cold snaps, 2015

²⁰ As defined by the Köppen climate classification system.

<http://www.thesustainabilitycouncil.org/resources/the-koppen-climate-classification-system/> (accessed 02 May 2018)



continental Europe, it can be exposed to continental weather influences that bring cold spells in winter and hot, humid weather in summer.

8.6.5 Current climate conditions at Heathrow can be summarised as:

1. Winter temperatures largely remain at or above freezing, with average daytime highs higher than 5°C
2. Summers are generally warm with average daily temperatures above 15°C. Warm weather is expected between May and September. On average, Heathrow experiences more than twenty days above 25°C per year, and approximately five days above 30°C
3. Temperatures at Heathrow can be up to 5°C higher than those experienced in the surrounding countryside because of the Urban Heat Island (UHI) effect²¹²²
4. Most precipitation during winter months falls as rain rather than snow. Snowfall at Heathrow has been uncommon in recent years due to the UHI effect and the overall increase in average temperatures
5. During summer months, rainfall is relatively low but often falls in heavy convective events
6. The prevailing wind directions is south-west and average wind speed is higher in the winter months
7. The number of days with lightning per season does not exceed 10 days. Summer is the season when most lightning occurs and winter is the season with least lightning.

8.6.6 The physical location of Heathrow (low-lying and relatively close to the River Thames) means that Heathrow is prone to fog, particularly freezing fog during autumn and winter months. There are approximately five days with fog during winter and five days in autumn. The number of days with fog in summer and spring are 0.3 and one day respectively.

8.6.7 Further detail on baseline information for surface, pluvial and other sources of flood risk is described in **Chapter 18: Water environment**.

²¹ Hacker, J., Belcher, S.E., and Yau, R.M.H, Climate scenarios for urban design: A case study of the London Urban Heat Island, 2017

²² Greater London Authority, London's Urban Heat Island: A summary for decision makers, 2016



Future climate baseline

- 8.6.8 Given the long lifetimes of many of the assets within the DCO Project²³, this section presents climate projections for three different time periods, specifically the 2020s (2010 to 2039), the 2050s (2040 to 2069), and the 2080s (2070 to 2099) which is the latest time period for which climate projections are available in the UK. Section 8.10: Proposed approach to the assessment, sets out the reasoning behind the selection of assessment years.
- 8.6.9 The revised draft ANPS, Section 4: Assessment Principles, states that the high emissions scenario against the 2080 projections at the 10%, 50% and 90% probability levels should be considered where transport infrastructure has safety-critical elements and the design life of the asset is 60 years or greater. As the DCO Project meets these criteria, the recommendation for projections in the revised draft ANPS is followed. The uncertainty and confidence (limited data for some climate variables, for example. fog and lightning) in the projections will be accounted for in both assessments and in the development of mitigation measures.
- 8.6.10 In-line with the revised draft ANPS, the H++ climate scenario will be considered to ensure that there are no critical features of the infrastructure design which may be seriously affected by more radical changes to the climate, beyond those projected in the high emissions scenario. Furthermore, a review of the latest IPCC research on more extreme climate change scenarios (for example. melting of ice at poles leading to changes in the polar vortex) will be undertaken to consider what their impact on the DCO Project would be and how they can be considered in the design.
- 8.6.11 The main changes in current climate conditions at Heathrow due to climate change are summarised for each of the relevant climate variables. Further information on climate change projections for these variables and the H++ scenarios are described in **Appendix 8.1**.

Temperature

- 8.6.12 The main changes in temperature over the coming century are projected to be an increase in both average and extreme high temperatures in all seasons.
- 8.6.13 Heatwaves and hot days are projected to occur more often and while average temperatures are projected to increase, cold spells may still occur.

²³ For the purpose of the climate change assessments (both ICCI and CCR), the lifetime of the DCO Project has been taken to be 100 years. This covers the most long-lived infrastructure elements. The use of intermediate timeframes allows consideration of infrastructure elements with more short-lived lifespans.



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Precipitation

- 8.6.14 There is greater uncertainty regarding projected changes to precipitation than for temperature. Mean winter precipitation is projected to remain similar to current mean precipitation for the 2020s and increase slightly in the 2080s, whereas summer precipitation is projected to decrease.
- 8.6.15 There is likely to be an increase in longer dry periods as well as in the frequency and intensity of heavy rainfall throughout the year by the 2080s.
- 8.6.16 Climate change is projected to have an impact on precipitation variability (changes in seasonal precipitation and year to year variation), which in turn will impact intensity and duration of droughts, floods and in soil moisture deficit. A combination of hotter and drier summers may also lead to an increase risk of wildfires.
- 8.6.17 Climate change allowances will be included in the Flood Risk Assessment (FRA) carried out for the DCO Project as described in **Chapter 18: Water environment**.

Wind

- 8.6.18 There is considerable uncertainty in changes to wind speed and direction. UKCP09 does not include probabilistic projections of changes to wind speed in the main searchable projections dataset. Probabilistic projections of changes to wind speed for different UK regions are available in an additional UKCP09 report²⁴. It is worth noting that UKCP18 projections will possibly include probabilistic projections for wind speed but not for wind gusts and wind direction²⁵.
- 8.6.19 Winter average wind speed is anticipated to change considerably and a small reduction is projected for summer average wind speed.

Fog

- 8.6.20 As in the case of wind projections, there is considerable uncertainty in climate change projections for fog. Probabilistic projections for fog are not available from UKCP09. However, UKCP published a report addressing future changes in fog frequency from a UKCP09 ensemble of regional climate model (RCM) projections²⁶. As per wind speeds, UKCP18 could possibly include probabilistic projections for fog.

²⁴ UKCP09, UKCP09: Probabilistic projections of wind speed, UKCP09 additional product, 2010

²⁵ Met Office, UK Climate projections: A project overview, July 2017

<https://www.metoffice.gov.uk/binaries/content/assets/mohippo/pdf/uk-climate/uk-cp/ukcp18-project-overview-final.pdf> (accessed 02 May 2018)

²⁶ UKCP09, UKCP09: Future change in fog frequency from the UKCP09 ensemble of regional climate model projections, UKCP09 additional product, 2010



- 8.6.21 Fog frequency is likely to significantly decrease in percentage terms in the spring, summer and autumn months by 2080 and there will be a reduction in the annual number of fog days. This represents a modest reduction in fog days of two to three days over the year from a baseline of 11 days. Fog frequency for winter months is projected to increase in the order of 20% (or one extra foggy day) over current conditions.
- 8.6.22 It is worth noting that UKCP09 uses a visibility threshold of 1,000m as an indicator of the presence of fog. This is greater than Heathrow's Instrumented Runway Visual Range (IRVI) which is <600m and a cloud ceiling <200ft, used to define low visibility¹⁰. This could potentially mean that a larger number of fog days are reported using the UKCP09 definition than those that would be recorded by Heathrow's IRVI.

Lightning

- 8.6.23 As in the case of fog, probabilistic projections for changes in lightning are not available. However, a report describing future changes projected by UKCP09 RCMs is available²⁷ and anticipates the following changes: lightning may become more frequent across the year at Heathrow in the future (in the 2080s); the greatest increase in lightning frequency is projected to occur in the autumn. While most models point towards an increase in lightning, the uncertainty in these projections are considered to be substantial by UKCP09.

8.7 Likely significant effects requiring assessment

- 8.7.1 All elements of the DCO Project as detailed in **Chapter 3: The DCO Project** are considered relevant, in so far as they may all be impacted by climate change or contribute to climate change resilience.

In-combination climate change impacts assessment

- 8.7.2 Likely in-combination climate change effects for all environmental topics associated with the DCO Project are described in Table 8.3. This is not an exhaustive list and more effects will be considered through the two-stage assessment process detailed in Section 8.9, which is generic across all environmental receptors.

²⁷ UKCP09, Future change in lightning from the UKCP09 ensemble of regional climate model projections, UKCP09 technical note, 2010



Table 8.3 Likely significant climate change effects – ICCI assessment

Activity	Effect	Receptor
Construction		
Land preparation, construction site	Extreme weather events or climatic events (strong winds, heatwaves, droughts, intense rainfall events) exacerbating health and safety impacts	Community receptors and resources close to construction sites
Construction site staff activity	Extreme weather events or climatic events (strong winds, heatwaves, droughts, intense rainfall events) exacerbating health and safety impacts	Construction workers
Construction site, earthworks, runway and terminal/satellite development	Extreme weather events or climatic events (strong winds, heatwaves, droughts, intense rainfall events) exacerbating environmental pollution impacts on air, land and water	Air, flora and fauna, soils and waterbodies
Operation		
Landscape elements	Change in seasonal patterns of rainfall and temperature resulting in changes in soil moisture levels, length of growing season and irrigation requirements for newly planted trees and green infrastructure	Flora and fauna, soils
Landscape elements	Change in seasonal patterns of rainfall and temperature resulting in changes in quality and quantity of habitats	Flora and fauna
Local water environments	Change in seasonal patterns of rainfall and temperature resulting in changes in high and low flows and/or changes in water bodies	Waterbodies, flora and fauna
Local surface transport and aircraft operations	Changes in seasonal patterns of rainfall, temperature and wind resulting in changes in air quality exacerbating health and safety impacts	Community receptors

Climate change resilience assessment

- 8.7.3 In addition to all elements of the DCO Project as detailed in **Chapter 3: The DCO Project**. The CCR assessment will also be informed by any critical assets or infrastructure connections upon which Heathrow is dependent for successful operation (outside of the DCO Project itself). This will include existing assets or infrastructure connections and those planned for the future (to be identified in the cumulative effects assessment).



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8.7.4 Some of the likely CCR effects for all assets and infrastructure associated with the DCO Project are described in Table 8.4. This is not an exhaustive list. Stage 1 in the CCR assessment (refer to paragraph 8.10.40) will identify all infrastructure, assets and operations associated with the DCO Project and how these could be potentially affected by climate hazards. The CCR assessment will consider all asset groups and further effects will be identified during the course of the assessment, which will be included in the Preliminary Environmental Information Report (PEIR). A generic approach to assessing all likely effects is described in Section 8.9.

Table 8.4 Likely significant climate change effects – CCR assessment

Activity	Effect	Receptor
Construction		
Construction site (including laydown areas, staff facilities) earthworks, runway and terminal/satellite development	Extreme weather events or climatic events (such as strong winds) resulting in effects on the resilience of construction equipment and resulting in delays to construction programme (such as strong winds resulting in crane topple)	Construction equipment
Access to construction sites	Extreme weather events or climatic events (such as heavy rainfall) resulting in effects on the viability of and access to construction sites (such as heavy rain resulting in surface water flooding of local roads, sources of power supply or inundation of construction site)	Local roads, electricity network, construction site
Operation		
Aircraft movements on the new runway and taxiways	High temperatures and heatwave events resulting in effects on aircraft operations (such as maximum take-off weight, heat damage to surfaces, and scheduling). Extreme precipitation events creating hazardous conditions on airside infrastructure.	Aircraft
New terminal and associated buildings	High temperatures and heatwave events resulting in effects on overheating of terminals and buildings. Extreme precipitation events overwhelming drainage system.	Terminals and buildings
Airport operations	High temperature and heatwave events resulting in a reduction in the resilience of aircraft operations (such as fire risk on site, flashpoint of aviation fuel being exceeded,	Airside operations



Activity	Effect	Receptor
	overheating of aircraft on stands). Increased variability of snow events reduces resilience of winter contingency. Extreme precipitation events creating hazardous conditions on airside infrastructure. Water shortage in drought conditions causing restrictions to water intensive activities. Extreme weather or climatic events (strong winds, heatwaves, droughts, intense rainfall events) reducing resilience of airside operations.	
Surface access to new terminal and buildings	Extreme weather events or climatic events (strong winds, heatwaves, droughts, intense rainfall events) and flooding resulting in effects on resilience of surface access connecting infrastructure (such as local roads and junctions or train routes and stations)	Local roads, junctions, rail network
Utilities provision to new terminal and buildings	Extreme weather or climatic events (strong winds, heatwaves, droughts, intense rainfall events) and flooding resulting in effects on resilience of utilities servicing the airport (such as power, gas, telecommunications).	Interdependent infrastructure systems

8.8 Effects not requiring assessment

8.8.1 No effects have been scoped out of the ICCI and CCR assessments. For the ICCI assessment, this is because much of the information required to carry out the assessment will not be available until other environmental topics have undertaken their own assessments. Stage 1 in the ICCI assessment will consider all topics and will determine which topics remain scoped in for detailed assessment and which are scoped out (refer to Section 8.9). For the CCR assessment no effects have been scoped out because the climate change resilience of all assets and infrastructure associated with the DCO Project are considered relevant until the assessment has been undertaken.

8.9 Proposed approach to the assessment

8.9.1 The study areas are set out in Section 8.4: Study areas. These will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed. Therefore, the study areas may evolve as appropriate.



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- 8.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Additional baseline information required

- 8.9.3 As described in Section 8.4: Study areas, should the study areas change in response to the evolving design, the need for any additional baseline data for climate change may be reviewed and updated.
- 8.9.4 UKCP09 gridded observational data is available for the time period 1914 to 2011¹⁵ at 5km² resolution and for the time period 1961 to 1990 at 25km². UKCP09 will be the main source of information for the current and future baseline, it will be complemented by other sources of data for variables for which UKCP09 does not provide information (for example wind direction). UKCP09 are being replaced by UKCP18 and therefore the future climate data will be updated accordingly. UKCP18 will have a phased release, the core raw data products are anticipated to be made available in May 2018 followed by a launch of the full data interface and support products in November 2018. UKCP09 will be used in the PEIR, and UKCP18 will be used in the final ES.

Assessment years

- 8.9.5 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the climate change assessment specifically.

Construction

- 8.9.6 The construction period is 2021-2035. The UKCP09 future time period used to assess changes in climate variables will be the '2020s', which is representative of 2010-2039.

Operation

- 8.9.7 For the ICCI, the future time period used will be the 2080s unless the design life of the receptor ends before then. For the resilience assessment, the future time period used to assess changes in climate variables will be dependent on the design life of each infrastructure assets that is considered. As required by the revised draft ANPS, the 2080s will be the future time period considered for assets with a design life of 60 years or greater.



Construction and operation assessment methodology

In-combination climate change impacts assessment

- 8.9.8 The ICCI assessment will comprise an assessment of whether an impact identified within an environmental topic (for example, landscape and visual, biodiversity) is affected by climate change (i.e. by the projected change in climate variables described in Section 8.6: Baseline conditions) within the anticipated lifetime of the DCO Project, which is considered to be 100 years, and what the consequence of climate change on this impact is.
- 8.9.9 The following key terms and definitions relating to the ICCI assessment are used:
1. A climate hazard is a weather or climate related event which has the potential to do harm to an environmental or community receptor or resource - an example of a climate hazard is reduced summer precipitation
 2. A climate change impact results from a climate hazard affecting the ability of the receptor or resource to maintain its function or purpose – a climate change impact can be direct, for example drying out of soils, or indirect, for example, limited tree growth as a result of soil moisture deficit
 3. A consequence of a climate change impact is any effect on the resource or receptor as a result of a climatic hazard having an impact
 4. An example of an ICCI is where the biodiversity topic has identified an impact arising from the DCO Project to a habitat (receptor) such as severance of semi-natural woodland, and in addition the climate change topic has established that this type of habitat will be impacted by future changes in precipitation patterns.
- 8.9.10 The proposed ICCI assessment methodology is in-line with the following guidance:
1. Institute of Environmental Management and Assessment (IEMA) *Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation*²⁸
 2. European Commission *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report*²⁹.
- 8.9.11 The proposed ICCI assessment methodology will also consider the following guidance and sources of information:

²⁸ Institute of Environmental Management and Assessment (IEMA): Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation, 2015

²⁹ European Commission: Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, 2017



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1. IPCC *Fifth Assessment Report (AR5)*³⁰
2. European Commission *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*³¹
3. *Strengthening Health Resilience to Climate Change: Technical Briefing for the World Health Organization - Conference on Health and Climate*³².

8.9.12 The ICCI assessment methodology will consist of two stages:

1. An initial assessment which will determine whether individual environmental topics are scoped in or out of further detailed assessment
2. A detailed assessment focussing on environmental topics which have been scoped in, including assessment of significance.

Stage 1 – initial ICCI assessment

8.9.13 During the initial ICCI assessment, the climate change team, working closely with the other environmental topic specialists, will produce high level, qualitative statements summarising the potential climate change hazards and effects for topic specific receptors and resources. This will be based on information from the current and future climate baseline data, a brief review of existing literature, and professional judgement.

8.9.14 The initial ICCI assessment will then consider any effects already identified by environmental topics based upon their own topic specific assessment methodologies. It will also consider any committed or embedded mitigation measures proposed by the environmental topic and the engineering and design teams, and whether any of these already address negative effects on the ability of resources and receptors to adapt to climate change.

8.9.15 The initial assessment will help to determine whether any potential additional mitigation measures may be required. The findings from this initial assessment will also be valuable for the CCR assessment.

8.9.16 The initial ICCI assessment will identify environmental topics for which potential ICCIs may be relatively more numerous and likely. Any topic for which there is at least one likely ICCI will remain scoped in. These topics will remain scoped in and a detailed assessment carried out on their ICCIs. The remainder of environmental topics will be scoped out and not taken forward to Stage 2.

8.9.17 The initial ICCI assessment will be informed by the following:

³⁰ IPCC, Fifth Assessment Report, 2013

³¹ European Commission: Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment, 2013

³² World Health Organization, Strengthening health resilience to climate change: Technical briefing, 2015



1. The potential climate change hazards and effects for topic specific receptors and resources
2. The initial assessment results from all topics' assessments, based on their own assessment methodologies
3. A literature review of recent and relevant science and policy
4. Qualitative estimates of the likelihood of the ICCIs occurring based on the likelihood of hazards occurring (point '1' in this list) together with the topic's assessment of the in-combination climate change impact occurring (point '2' in this list).

8.9.18 Table 8.2.1 in **Appendix 8.2: In-combination climate change impacts assessment - template** illustrates the anticipated output of the initial Stage 1 ICCI assessment.

Stage 2 – detailed ICCI assessment

- 8.9.19 In Stage 2, a detailed assessment will be undertaken. The significance of ICCIs is dependent on the extent to which climate change alters and creates a significant effect against the relevant criteria for each environmental topic. It is based upon quantitative and qualitative assessment of the likelihood and consequence of climate change effects on receptors which have already been identified as being impacted by the DCO Project.
- 8.9.20 The detailed assessment will be undertaken by the climate change topic and environmental specialists from the scoped in topics in an integrated approach.
- 8.9.21 The likelihood levels of a climate hazard occurring are described using probability values taken from the definitions used in the UKCP09 projections, and will be based on the high emissions scenario, or other data sources where required.
- 8.9.22 The likelihood of climate change impacting many of the scoped in ICCIs will often be described qualitatively or semi-quantitatively, as there are few specific climate thresholds available. Professional judgement is used where there are no relevant thresholds for quantitative assessment.
- 8.9.23 The climate change specialists and topic leads will use available published data on the link between the environmental impact and the effect (for example, in the case of impact of reduced precipitation on broadleaved woodland, taking into account whether there is published evidence on the deterioration of existing woodland or reduced growth rate of newly planted woodland during reduced precipitation time periods), climate projections and expert judgement to determine a qualitative description of the climate impact facing each receptor. Where a quantitative threshold has been established (for example a specific temperature above which a



change to a habitat or species occurs), this will be used to inform the assessment of likelihood.

- 8.9.24 The criteria used to define the consequence of an ICCI for specific receptors will be based on the criteria produced for each environmental topic. The assessment of the consequence of the ICCI will be based on the extent to which climate change exacerbates the effect already identified in the topic assessments. The spatial extent, duration and time horizon of the climate change impact will be considered when determining whether the consequence of the DCO Project on the environmental receptor in question should be increased.
- 8.9.25 ICCIs where the consequence is such that the effect is deemed significant against the relevant environmental topic criteria will be considered significant in-combination climate change effects, unless it is unlikely that the impact will occur within the operational lifespan of the DCO Project.
- 8.9.26 Mitigation measures will be developed during the EIA process. These measures are referred to as embedded mitigation and will be included within the assessments of significance presented in the ES. Any additional mitigation measures for residual effects will be incorporated into the Climate Change Adaptation Plan (see Section 8.10: Approach to mitigation), which considers the detailed design, construction and operation phases of the DCO Project. All data, including climate projections, hazards, and descriptions of effects, likelihoods and consequences, will be used to inform the Climate Change Adaptation Plan as it develops following the submission of the ES.
- 8.9.27 The exception to the largely qualitative approach described here is the assessment for flood risk and drainage design. A separate FRA will be carried out, which will be quantitative and will follow current Environment Agency guidance on climate change allowances for increases in peak river flow and rainfall intensity.
- 8.9.28 A compatible future climate scenario will be developed under the groundwater modelling task, given that changes in groundwater (baseflow) accretion to surface waters may inform the conclusions of the FRA.
- 8.9.29 Table 8.2.2 in **Appendix 8.2** illustrates the anticipated template used to present the outputs of the Stage 2 assessment.

Climate change resilience assessment

- 8.9.30 The CCR assessment evaluates whether the climate resilience of the DCO Project is affected by climate change (i.e. by the projected change in climate variables described in Section 8.6) within the anticipated lifetime of the DCO Project. Existing Heathrow infrastructure and assets will be considered only insofar as the underlying climate resilience of existing Heathrow infrastructure and assets may influence aspects of the climate resilience of new elements.



- 8.9.31 The following key terms and definitions relating to the CCR assessment are used; these are in line with those used in the UK Climate Change Risk Assessment 2012³³ and the UK Climate Change Risk Assessment 2017³⁴ but have been adapted to suit the climate change resilience assessment within the EIA context (for example, consequence here refers to a negative consequence rather than a positive, neutral or detrimental consequence; and impact refers to damages rather than any effect):
1. A climate hazard is a weather or climate related event which has the potential to do harm to the infrastructure and assets associated with the DCO Project, an example of a climate hazard is a high precipitation event
 2. An impact can be any type of damage to the infrastructure or assets or interference with their ability to operate as a result of a climate hazard – an impact can be direct, for example flooding of the infrastructure or assets, or indirect, for example heat exhaustion of workers
 3. A consequence is any negative or positive effect on the DCO Project as a result of climate change having an impact and can be associated with safety, cost, journey times or public perception
 4. Risk combines the likelihood of an impact resulting from a climate hazard on infrastructure, assets and operations, taking into account mitigation measures, and the consequence resulting from the impact if it occurs.
- 8.9.32 An example of the resilience of the DCO Project being affected by climate change is the overheating of buildings due to an increase in high temperatures. In this example, the hazard is the high temperature, the impact is the overheating in buildings, one consequence could be losses or delays caused by reduced staff productivity. The level of risk to the DCO Project is then estimated as the combination of the likelihood of overheating in buildings due to an increase in temperature and the losses incurred due to reduced staff productivity.
- 8.9.33 The proposed CCR assessment methodology is in-line with the following guidance:
1. Institute of Environmental Management and Assessment (IEMA)
*Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation*²⁸

³³ Department for Environment, Food & Rural Affairs, UK Climate Change Risk Assessment: Government Report, January 2012

³⁴ Department for Environment, Food & Rural Affairs, UK Climate Change Risk Assessment 2017, January 2017



2. European Commission Environmental Impact Assessment of Projects: *Guidance on the preparation of the Environmental Impact Assessment Report*²⁹.

8.9.34 The proposed CCR assessment methodology considers the following guidance and sources of information:

1. Cabinet Office. *Keeping the Country Running: Natural Hazards and Infrastructure*³⁵
2. IPCC *Fifth Assessment Report (AR5)*³⁰
3. European Commission *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*³⁶
4. Heathrow Airport: *Climate Change Adaptation Reporting Power Report 2011³⁷ and 2016 progress report*³⁸
5. International Civil Aviation Organization (ICAO): *Environmental Report 2010. Chapter 6: Adaptation*³⁹
6. Airports Cooperative Research Programme (ACRP): *Climate Change Adaptation Planning: Risk Assessments for Airports*⁴⁰
7. European Commission: *Guidelines for Project Managers: Making vulnerable investments climate resilient*⁴¹.

8.9.35 The assessment of climate change resilience effects comprises two stages:

1. Climate hazard assessment and identification of all infrastructure, assets and operations
2. Climate change risk assessment, including assessment of significance.

Stage 1 – climate hazard assessment

8.9.36 The climate hazard assessment provides an estimate of the likelihood of climate hazards occurring, based on the projected changes to the current climate baseline

³⁵ Cabinet Office, *Keeping the Country Running: Natural Hazards and Infrastructure A guide to improving the resilience of critical infrastructure and essential services*, 2013

³⁶ European Commission, *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*, 2013

³⁷ Heathrow Airport, *Climate Change Adaptation Reporting Power Report*, May 2011

³⁸ Heathrow Airport, *Climate Change Adaptation and Resilience Progress Report*, July 2016

³⁹ ICAO, *Environmental Report 2010, Chapter 6: Adaptation*, 2010

⁴⁰ ACRP, *Climate Change Adaptation Planning: Risk Assessments for Airports*, 2015
<http://www.trb.org/Publications/Blurbs/173554.aspx> (accessed 02 May 2018)

⁴¹ European Commission. *Guidelines for Project Managers: Making vulnerable investments climate resilient*, 2011. Available online: <https://climate-adapt.eea.europa.eu/metadata/guidances/non-paper-guidelines-for-project-managers-making-vulnerable-investments-climate-resilient/guidelines-for-project-managers.pdf> (accessed 02 May 2018)



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using UKCP09 projections. The following climate hazards will be assessed and have been identified based upon UKCP09 projections and professional judgement:

1. Short duration, extended and multiple periods of high precipitation
2. Extended periods of low precipitation
3. High temperatures
4. Low temperatures (including snow and ice)
5. Strong winds (including storms)
6. Lightning
7. Fog.

8.9.37 The likelihood of the hazards occurring will be assessed in line with the criteria referred to in Table 8.5. These are aligned with the likelihood levels defined in UKCP09⁴². The climate change scenario used in the assessment will be the high emissions scenarios and considers the uncertainty range contained within the UKCP09 projections. This is based on requirements in the revised draft ANPS to consider the range of uncertainty in the high emissions scenario for transport infrastructure with safety-critical elements and a design life of over 60 years.

Table 8.5 Proposed criteria to assess likelihood of hazard in the CCR assessment (based upon UKCP09)

Level of likelihood	Very unlikely	Unlikely	Possible	Likely	Very likely
Likelihood of occurrence	<10% probability	<33% probability	33%-66% probability	>66% probability	>90% probability

8.9.38 The level of likelihood will be based on the climate projections, and will take into account the level of confidence in the projections, reflecting the fact that for specific climate variables there is greater uncertainty and relatively less confidence in the projections.

8.9.39 The climate hazard assessment will consider how future changes in the climate variables listed in Section 8.5: Sources of data used in scoping, may have the potential to result in a significant effect on infrastructure and assets within the land being considered for the DCO Project.

⁴² UK Climate Projections, Unlikely <http://ukclimateprojections.metoffice.gov.uk/23192> (accessed 02 May 2018)



- 8.9.40 Stage 1 will also comprise the identification of all infrastructure, assets and operations associated with the DCO Project. A review of relevant technical documentation will be undertaken by climate change specialists, focusing on design requirements and specifications relevant to weather and climate change resilience and applying them to the design life of each infrastructure asset.
- 8.9.41 The following outputs of Stage 1 will inform Stage 2:
1. Climate hazard assessment (likelihood of the climate hazards occurring)
 2. List of infrastructure, assets and operations within the DCO Project
 3. Summary of focussed review of technical documentation, requirements and specifications, focussed on identifying climate change resilience aspects.

Stage 2 – full climate change risk assessment

- 8.9.42 Following the climate hazard assessment, a risk assessment will be undertaken by climate change topic specialists in-collaboration with relevant design teams (for example airfield and runway, roads and junctions, rivers and flood, earthworks/platform, terminals, satellites, aprons, connectivity, commercial, landscaping, utilities and surface access). Discussions with asset management personnel responsible for existing Heathrow operations and the climate change adaptation process already in place will ensure current best practice in existing operations is considered.
- 8.9.43 The risk assessment will consider the likelihood of each of the identified climate hazards resulting in an impact on the infrastructure, assets and operations of the DCO Project (hereon referred to as likelihood of an impact), and the potential consequences of this on the DCO Project.
- 8.9.44 The assessment of impact on the DCO Project will consider the resilience of relevant infrastructure, assets and operations, taking into account design requirements and specifications and any existing mitigations already committed to or embedded within the design. As such, the climate change assessment team will work in an integrated fashion with the design teams responsible for relevant aspects of the DCO Project.
- 8.9.45 The potential likelihood of an impact and consequences for infrastructure, assets and operations associated with the DCO Project will be scored using a semi-quantitative five-point scale summarised as:
1. Likelihood of impact – very likely, likely, as likely as not, unlikely, very unlikely
 2. Consequence of impact – very high, high, medium, low, very low.



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- 8.9.46 The resulting risk level will be scored as either: very high, high, medium, low, very low.
- 8.9.47 The likelihood of an impact is a composite of the likelihood of occurrence of the hazard (refer to Table 8.5) and the resilience of the relevant infrastructure, assets or operation given existing mitigation measures (refer to definitions in Table 8.6).
- 8.9.48 Following consideration of potential climate change effects, informed professional judgement will be used by relevant design leads to produce qualitative statements of consequence. A workshop approach will be used to define levels of consequence and thus overall risk.
- 8.9.49 The criteria used to assess levels of likelihood of an impact, consequence and risk are shown in Table 8.6, Table 8.7 and Table 8.8, respectively.

Table 8.6 Proposed criteria to assess likelihood of an impact in the CCR assessment based upon professional experience of climate change specialists

Level of likelihood	Definition of likelihood
Very unlikely (1)	Given existing mitigation measures impact is highly improbable to occur during the 100-year lifetime of the DCO Project infrastructure and 40 years for lifetime of key assets/systems and ten years for construction phase.
Unlikely (2)	Given the existing mitigation measures impact is not expected to occur during the 100-year lifetime of the DCO Project infrastructure and 40 years for lifetime of key assets/systems and ten years for construction phase.
As likely as not (3)	Given existing mitigation measures impact may occur during the 100-year lifetime of the DCO Project infrastructure and 40 years for lifetime of key assets/systems and ten years for construction phase.
Likely (4)	Given existing mitigation measures impact is expected to occur during the 100-year lifetime of the DCO Project infrastructure and 40 years for lifetime of key assets/systems and ten years for construction phase.
Very likely (5)	Given existing mitigation measures impact is highly probable to occur during the 100-year lifetime of the DCO Project infrastructure and 40 years for lifetime of key assets/systems and ten years for construction phase.



Table 8.7 Proposed criteria used to assess consequence to the DCO Project resulting from a potential impact based upon professional experience of climate change specialists

Level	Safety	Cost	Passenger Journey Times	Public Perception
Very low (1)	Minor harm or near miss	<£5m	Minor delays <1 hour	Short-term negative local stakeholder reaction
Low (2)	Lost time injury or medical treatment required, short term impact on persons affected	£5m to £25m	Substantial delays >1 hour	Negative local media reports over sustained period; localised stakeholder concern
Medium (3)	Long-term injury or illness, prolonged hospitalisation or inability to work	£25m to £100m	Major delays and cancellations <1 day	Significant local and /or regional reports including social media; national media interest creating public concern
High (4)	Single fatality/multiple long-term injuries	£100m to £250m	Major cancellations 1-14 days	Extensive prolonged Negative national reporting and public disputes with key stakeholders.
Very high (5)	Multiple fatalities	>£250m	Severe cancellations >2 weeks	Extensive and prolonged negative reporting nationally and or public disputes with key stakeholders.

Table 8.8 Proposed criteria used to assess risk levels for the CCR assessment based upon professional experience of climate change topic

Consequence	Very high (5)	Low	Medium	High	Very high	Very high
	High (4)	Low	Low	High	High	Very high
	Medium (3)	Low	Low	Medium	High	High
	Low (2)	Very low	Very low	Medium	Medium	Medium
	Very low (1)	Very low	Very low	Low	Low	Low
		Very unlikely (1)	Unlikely (2)	As likely as not (3)	Likely (4)	Very likely (5)
Likelihood of the impact occurring (a climate hazard having an impact)						



- 8.9.50 Risks assessed to be ‘medium’, ‘high’ or ‘very high’ will be considered to result in significant climate change resilience effects. Mitigation measures will then be developed for all significant climate change resilience effects. This will occur early in the design process to ensure that mitigations can be built into the design of the DCO Project as it is assessed at DCO submission. The risk assessment will be updated to consider embedded mitigations as they are developed so the final assessment of significance will only show residual effects.
- 8.9.51 In relation to flood risk and drainage design, it should be noted that NPPF planning requirements⁴ and Environment Agency design guidance relating to climate change apply. Therefore, a separate FRA will be conducted, which will include an assessment of climate change effects on flood risk, taking into account current Environment Agency climate change allowances for increases in peak river flow and rainfall intensity. The results of these assessments will be considered by the climate change team, the relevant DCO Project engineering and design teams, and the water environment topic team, as part of the overall CCR assessment.
- 8.9.52 In relation to the groundwater flood risk, the water environment team will also assess how future changes in recharge may affect groundwater levels and flow direction, and the interaction with both sub-surface infrastructure and the land surface.
- 8.9.53 In line with the revised draft ANPS, the UKCP09 H++ scenarios, including those for sea level rise, will also be considered in the workshops with design leads when relating to critical features of the DCO Project. This will identify where necessary actions can be taken to ensure the operation of the infrastructure over its estimated lifetime through potential further adaptation. This will feed into the Climate Change Adaptation Plan, which will be included in the DCO submission.
- 8.9.54 A high-level template for presenting the results of the CCR assessment can be found in **Appendix 8.3: Climate change resilience assessment – template**.

Cumulative effects

- 8.9.55 Cumulative climate change effects resulting from the combination of effects from the DCO Project and other developments will be assessed in accordance with the approach referred to in Section 4.6: Cumulative effects assessment.

8.10 Approach to mitigation

- 8.10.1 The approach to mitigation considers:
1. Embedded mitigation, which are those developed with environmental topic leads and design teams during the EIA process



2. Additional mitigation, which are those that are required to mitigate residual effects in the impact assessment. Additional mitigations required during the detailed design, construction and operation phases are set out in a Climate Change Adaptation Plan, to be delivered as part of the DCO submission.

In-combination climate change impacts assessment

- 8.10.2 The ICCI assessment will work with environmental topic leads to embed mitigation measures into the design of the DCO Project, as described in Section 8.9: Proposed approach to the assessment. The assessment of significance will therefore identify residual effects.
- 8.10.3 Additional mitigation measures will be developed for any significant in-combination climate change effects identified as part of the assessment. The additional mitigation measures will be developed by the climate change topic in collaboration with the relevant environmental topic specialists.
- 8.10.4 The additional mitigation measures developed will also include and consider allowances for future measures and monitoring to ensure the continued resilience of receptors and resources. Consideration of adaptive management and measures^{43,44} which allow for flexibility and accommodate uncertainty will be included in the development of mitigation measures. Additional mitigation measures will be based on the latest UK Climate Change Projections and the most recent UK Climate Change Risk Assessment.
- 8.10.5 Adaptation measures to be incorporated in further design, construction and operations phases will be incorporated into a Climate Change Adaptation Plan, which will be produced as part of the DCO submission. This will address the need for on-going review of climate hazards and risks during post DCO stages, and is in line with the relevant IEMA guidance²⁸. The Climate Change Adaptation Plan will be integrated with existing Heathrow adaptation reporting processes and will be owned by the infrastructure operator. Adaptation measures associated with the DCO Project will be incorporated into Heathrow's third response under the Adaptation Reporting Power set out in the Climate Change Act 2008⁸. Adaptation measures may also be embedded into the draft Code of Construction Practice (CoCP), where appropriate.

⁴³ 'Flexible' or 'adaptive management' options involve putting in place incremental adaptation options rather than undertaking large-scale adaptation at one point in time. Measures are introduced through an assessment of what makes sense today, but are designed to allow for incremental change, including changes in approach, as knowledge, experience and technology evolve

⁴⁴ UK Climate Impacts Programme, Identifying adaptation options http://www.ukcip.org.uk/wp-content/PDFs/ID_Adapt_options.pdf (accessed 02 May 2018)



Climate change resilience assessment

- 8.10.6 The assessment of likelihood and consequence of impact will consider embedded mitigation measures already in place. These have been developed during the EIA assessment process as described in Section 8.8: Effects not requiring assessment. Working with all relevant design teams and asset operators at the existing airport will ensure that adaptations are brought into the design of the DCO Project as it develops, and thus the final assessment of significance is based on a design with resilience measures already incorporated. Mitigations therefore relate to residual significant effects.
- 8.10.7 Risks assessed to be a 'medium', 'high' or 'very high' risk are considered to result in significant residual effects. Additional mitigation measures will be developed for them through integrated working with the relevant topic leads. As stated in the revised draft ANPS, additional mitigation measures will be informed by the latest UK Climate Projections and the most recent UK Climate Change Risk Assessment.
- 8.10.8 The additional mitigation measures developed will include and consider allowances for adaptation throughout the operation phase (i.e. that do not need to be embedded into the original design) and monitoring processes, both of which ensure the continued resilience of the DCO Project. Accordingly, flexibility will be built into the design to accommodate climate change uncertainty, where practicable (for example, ability to retrofit/re-purpose buildings, increase flood defence etc.).
- 8.10.9 Adaptation measures to be incorporated in further design, construction and operations phases will be incorporated into a Climate Change Adaptation Plan, which will be produced as part of the DCO submission. This will address the need for on-going review of climate hazards and risks during post DCO-approval design stages, and is in-line with the relevant IEMA guidance²⁸. The Climate Change Adaptation Plan will be integrated with existing Heathrow adaptation reporting processes and will be owned by the infrastructure operator. Adaptation measures associated with the DCO Project will be incorporated into Heathrow's third response under the Adaptation Reporting Power set out in the Climate Change Act 2008⁸. Adaptation measures may be embedded into the draft CoCP, where appropriate.



Chapter 9

Community



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9. COMMUNITY

9.1 Introduction

9.1.1 This chapter describes the scope of the assessment as it relates to communities. It is intrinsically linked to the assessment of effects on **Chapter 10: Economics and employment**. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.

9.1.2 This chapter describes:

1. The policy and legislative context relating to communities
2. Topic specific stakeholder engagement so far and future proposed engagement
3. The study areas for the assessment
4. Sources of data used for scoping
5. Baseline conditions, including current desk studies and surveys
6. Likely significant effects of the DCO Project on communities
7. Effects not requiring assessment
8. The proposed approach to the assessment
9. Approach to mitigation

9.1.3 The community assessment will identify effects on people, homes and community facilities/public services, public open space and routes including recreation as a result of the construction and operation of the DCO Project. These are outlined in Section 9.7: Likely significant effects requiring assessment.

9.1.4 This assessment will also draw on the outputs of other environmental topics (such as noise, air quality, landscape and visual amenity and health) and the Equality Impact Assessment (separate assessment) where they have the same sensitive receptors as this assessment (i.e. people, homes and community facilities/public services, public open space and routes including recreation).

9.1.5 Other environmental topics are required to apply standard thresholds and criteria to identify the significance of environmental effects on community receptors, and identify the approach and steps to avoid, minimise and mitigate to avoid or reduce the significance of the effects. Where proportionate and reasonable attempts at technical mitigation identified by those other assessments cannot reduce residual impacts to a less than significant level (e.g. where the scale of environmental effects following mitigation still means that a community facility cannot continue to



operate effectively) the effect that remains on the community receptor will be assessed by this assessment.

- 9.1.6 In addition to this chapter, an assessment of in-combination, non-additive environmental effects on communities at a local scale will be undertaken as set out in Section 4.7: In-combination effects.
- 9.1.7 These in-combination effects may occur both simultaneously and sequentially. The key requirement is to identify whether combined effects on particular locations, resources or receptors may give rise to any new or more significant effects. The in-combination assessment will be drawn upon and informed by the community assessment but will be reported separately in the ES.

9.2 Policy and legislation

- 9.2.1 This section identifies the relevant topic specific national and regional policies that have informed the scope of the assessment presented in **Chapter 9: Community**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter. There is no relevant legislation for consideration of this assessment over and above The Infrastructure Planning (EIA) Regulations ('the EIA Regulations').

Table 9.1 Policy relevant to the community assessment

Policy	Relevance to assessment
<p>Revised draft Airports National Policy Statement (ANPS)¹</p>	<p>The revised draft ANPS sets out the framework for decision making on development consent applications for the DCO Project.</p> <p>It outlines the applicant’s requirements for assessing effects on communities and people, and identifies the approach to community engagement, compensation and mitigation in respect of these effects.</p> <p>Specifically, it refers to the preference for airport expansion at Heathrow in part due to its “<i>significant package of measures to address its environmental and community impacts</i>” (para 1.5).</p> <p>The ANPS requires that “<i>final impacts on affected groups should be the subject of a detailed review, carefully designed through engagement with the local community</i>” (para 1.33).</p>

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Policy	Relevance to assessment
	<p>It requires that “a number of mitigation measures will need to be applied to reduce the impacts of the Heathrow Northwest Runway scheme felt by the local community” (para 3.73).</p> <p>Compensation measures will also be required, as set out at paragraphs 5.237 to 5.251. The Government “expects to see arrangements being made for the community compensation schemes which Heathrow Airport has publicly stated would be provided, and for a community compensation fund” (para 5.247).</p> <p>The ANPS states that “where appropriate, the applicant should seek to deliver improvements or mitigation measures that reduce community severance and improve accessibility” (para 5.13).</p> <p>The ANPS also details expectations for community engagement (from para 5.252). It outlines that the applicant “must engage constructively with the Heathrow Community Engagement Board throughout the planning process, with its membership (including an independent chair), and with any programme(s) of work the Heathrow Community Engagement Board agrees to take forward” (para 5.256).</p>
<p>National Networks National Policy Statement (NN NPS)²</p>	<p>The nature of the DCO Project means that the NN NPS could apply to parts of it.</p> <p>The revised draft ANPS states at paragraph 4.8 that “The Secretary of State will consider any relevant nationally significant road and rail elements of the applicant’s proposals in accordance with the National Networks NPS and with the Airports NPS. If there is conflict between the Airports NPS and other NPSs, the conflict should be resolved in favour of the NPS that has been most recently designated.”</p> <p>The NN NPS sets out the framework for decision making on development consent applications for strategic infrastructure projects related to road and rail. This includes the Government’s vision and strategic objectives for national networks to “join up our communities and link effectively to each other” (page 9). The NN NPS requires the applicant to assess effects on community amenity and severance.</p>
<p>National Planning Policy Framework (NPPF)³ (2012)</p>	<p>The NPPF sets out planning policy for England and places a general presumption in favour of sustainable development. It identifies three elements of sustainable development including a social role “in supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future</p>

² Department for Transport, National Policy Statement for National Networks, 2014

³ Department for Communities & Local Government, National Planning Policy Framework, 2012



Policy	Relevance to assessment
	<p><i>generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being" (para 7).</i></p> <p>The NPPF is the overarching national planning policy that refers to treatment of community facilities and local services including sport and recreation space, housing and affordable housing, crime and community cohesion in the context of development. It would be a relevant and important consideration in relation to the examination of the DCO.</p> <p>A revised NPPF⁴ is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard. The revised NPPF is likely to continue to support the social role of development as set out above.</p>
The London Plan⁵	<p>The London Plan sets out the framework for development across London. It identifies population, housing and economic characteristics of London and its sub-regions and in particular sets out expectations for development, design and standards for provision of some community facilities and public spaces.</p>

9.2.2 Due regard will also be given to local policies and the Government's 25 year environment plan⁶ where they are relevant.

9.3 Stakeholder engagement

9.3.1 To date, engagement with stakeholders regarding the scope of the assessment of impacts of the DCO Project on communities has focused on statutory consultees, via the Heathrow Strategic Planning Group (HSPG)⁷. This engagement relates to the baseline for the community assessment, approach to the assessment, impact assessment and approach to mitigation. This will continue on a regular basis to discuss progress and seek to agree the principles of the assessment. A summary of engagement undertaken with the HSPG to date is outlined in Table 9.2. Engagement will continue with HSPG and local authorities within which the Project resides.

9.3.2 Engagement will also be undertaken with and through the Heathrow Community Engagement Board (HCEB, also described in Section 4.9: Engagement). The HCEB provides an opportunity for the needs of the local community to influence

⁴ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018

⁵ Greater London Authority, The London Plan: The Spatial Development Strategy for Greater London, 2017

⁶ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018

⁷ The membership of the HSPG is set out in Section 4.9: Engagement



the design and operation of the Airport. The HCEB will play a key role in ensuring that communities are able to contribute effectively to the planning process and influence the plans.

9.3.3 Feedback from Consultation 1 (January to March 2018) will continue to inform the development of the design and comments relevant to the community assessment.

9.3.4 Furthermore, a list of other stakeholders with whom future engagement will be undertaken as part of the community assessment is also being developed. Paragraphs 9.3.5-9.3.7 identify the majority of these by broad category.

Table 9.2 Engagement with stakeholders

Topic area	Engagement undertaken
<p>Recreation and amenity (sports and leisure facilities, recreational spaces and routes)</p>	<p>An initial workshop was held with HSPG members (including the Colne Valley Regional Park who are part of the HSPG) in December 2017. This workshop introduced the Applicant’s technical assessment team to the HSPG, and provided an overview on approach to:</p> <ol style="list-style-type: none"> 1. Defining a study area 2. Identifying baseline and datasets 3. Walkover and user surveys 4. Broad overview of the assessment. <p>HSPG’s comments (and Applicant responses) are set out in Appendix 9.1: Recreation and Amenity Impact Assessment Technical Note for HSPG (March 2018) which was prepared for discussion at a second meeting in March 2018. These comments are reflected in this scoping chapter. GIS datasets and other material were also provided by the HSPG which have been used to inform scoping and the baseline. The approach to the definition of the study area boundary has been based on a number of principles which were discussed and broadly agreed with the HSPG. There was further commentary from some members of the HSPG regarding the actual extent of the study area if it needed to be extended further. Further clarity on the extent of the study area is set out in Section 9.4: Study areas and Appendix 9.1.</p> <hr/> <p>A second meeting was held with HSPG members in March 2018. The meeting provided an overview on:</p> <ol style="list-style-type: none"> 1. Applicant response to comments from the HSPG following the meeting held in December 2017 2. Update on assessment resources (including walkover and user surveys) 3. Study area 4. Assessment methodology (including approach to assessing significance). <p>Further clarity on the reasoning for the divide between formal and informal recreation was requested by the HSPG. To address this, formal and informal recreation has been redefined as follows (and clarified further in Section 9.6: Baseline conditions):</p>



Topic area	Engagement undertaken
	<ol style="list-style-type: none"> 1. Sports and leisure facilities (considered within community facilities and will include outdoor and indoor sports facilities, allotments, urban farms and civic spaces) 2. Recreational spaces and routes (includes all other recreation within public open spaces and routes). <p>Comments regarding the study area are clarified in Section 9.4. Comments regarding updates to the baseline resources, figures and assessment methodology will be addressed in advance of the next HSPG meeting.</p>
<p>Community⁸</p>	<p>An initial workshop was held with HSPG members in February 2018. This workshop introduced the Applicant’s technical assessment team to the HSPG and provided an overview on the scope of the community assessment including:</p> <ol style="list-style-type: none"> 1. The overall approach to and structure of the community (and economics and employment) assessment as part of an application for DCO, including the adaptive approach to assessment (refer to Section 9.9: Proposed approach to the assessment) 2. The types of effects and key issues that are likely to be considered in this assessment 3. The role of engagement 4. The relationship to other environmental topics 5. Broad indicative study areas for effects 6. Approach to in-combination, non-additive environmental effects on local communities (refer to Section 4.7: In-combination effects). <p>HSPG members provided comments on the topics outlined above, which are reflected in this scoping chapter. Details of the comments received (and the Applicant’s response) are set out in Appendix 10.1: Community and Employment/Economic EIA Technical Note for HSPG (May 2018).</p> <p>A second workshop was held with HSPG members in May 2018. This workshop provided an opportunity for clarification of any comments received as set out in Appendix 10.1. The workshop included:</p> <ol style="list-style-type: none"> 1. An update to progress in developing the scope of the assessment since the previous meeting 2. The role of a Joint Evidence Base and Infrastructure Assessment in the assessment of socio-economic effects of the DCO Project 3. An update and review of the study areas to be used for the assessments 4. An overview of the types of significant effects, and their scale, to be included in the assessments (and to be scoped out, where relevant) 5. An overview of assessment years to be used in the assessment. <p>The HSPG members provided verbal feedback and will respond to the Technical Note issued. It was noted at the meeting that HSPG responses will inform the assessment in regard to:</p> <ol style="list-style-type: none"> 1. Identified evidence base documents – such as Joint Strategic Needs Assessments – that will form part of the collaborative baseline to the assessment

⁸ Community assessment aspects other than recreation and amenity.



Topic area	Engagement undertaken
	2. The community receptors identified by the Applicant – these will be reviewed and agreed between the HSPG and the Applicant for the assessment.

9.3.5 Additional stakeholders with whom engagement will also be undertaken in order to fully understand baseline characteristics, impact significance and approaches to mitigation, include:

1. National organisations, providers of standards and guardians of community receptors (such as Sport England and Sustrans)
2. Regional bodies responsible for setting guidance and policy on standards for community facility provision such as the Greater London Authority
3. Owners, occupiers, tenants and landlords, and providers/managers of housing across all tenures
4. Representatives of local communities including Parish Councils, Residents Associations and other community groups and individuals
5. Owners, operators, tenants and providers of community facilities and community-facing businesses. Community facilities include:
 - a. Schools
 - b. Childcare (e.g. nurseries)
 - c. Sports and leisure facilities including allotments, equipped play areas and indoor and outdoor sport
 - d. Healthcare – GP surgeries, pharmacies, opticians, dentists
 - e. Libraries
 - f. Community centres, Village halls etc
 - g. Community-facing businesses (e.g. pubs)
 - h. Places of worship
 - i. Special Educational Needs provision.
6. User groups associated with affected community facilities, along with any charity organisations, community groups, clubs and organisations. These include:
 - a. Sports and recreation clubs with and without accommodation
 - b. Faith and religious groups



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c. Residents groups and Community Associations/Partnerships.

- 9.3.6 Stakeholders have been identified based on their location and the effects they are likely to experience, with input from the HSPG to ensure there is a thorough and robust approach to stakeholder engagement. User surveys will also be drawn upon where published by Local Planning Authorities, and undertaken with regard to users of recreational facilities, spaces and routes as detailed later in this chapter.
- 9.3.7 Heathrow regularly engages with these stakeholders with regard to on-going operations of the Airport and in some cases engagement with regard to expansion has begun. Initial meetings to discuss the possible implications of expansion have been held with those community facilities known to be directly affected by expansion as identified by the Appraisal of Sustainability accompanying the revised draft ANPS⁹ including Harmondsworth Primary School and Wonderland Nursery. Engagement has also been sought with the London Borough of Hillingdon with regard to the community facilities within its boundary.
- 9.3.8 Similarly, engagement has begun with other community facilities potentially affected by environmental effects of the DCO Project including Sant Nirankari Mission, Pippins Primary School, Colnbrook Primary School, William Byrd Primary School and Heathrow Primary School.
- 9.3.9 Engagement has also been undertaken through 'listening events' with local communities as spatially defined in Section 9.4. These drop-in events were held during April and May 2018 to enable local residents to explain their key sensitivities, the things they like about their communities, and the things they would like to change (regardless of expansion) about their communities. This feedback is currently being collated and will be a source of influence in the assessment of sensitive receptors for this assessment.

9.4 Study areas

- 9.4.1 This section sets out the proposed study areas for the community assessment. As the design and consultation processes progress, the DCO Project is refined and related topic study areas are confirmed, the study areas may continue to evolve to accommodate any changes that are generated. If the study areas change, data collection may also be reviewed and updated.
- 9.4.2 The study areas for the community assessment have been defined based on the anticipated scale of effects, the type of effects and receptors, and engagement with stakeholders. The approach to defining the study areas is influenced by

⁹ Department for Transport, Appraisal of Sustainability: Revised draft Airports National Policy Statement, October 2017



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professional judgement and is proportionate to focus on the geographic extent of the area across which potentially significant effects on community receptors might reasonably be predicted to arise as a result of the DCO Project, taking into account the location of those receptors (namely people and community facilities).

- 9.4.3 The physical expansion of Heathrow Airport and related infrastructure set out in **Chapter 3: The DCO Project** will result in the loss, displacement and other changes (such as severance and access changes) to homes and their owners or tenants, community facilities, and public recreational spaces and routes. These directly affected receptors help to define the inner study area at the ‘community’ level.
- 9.4.4 There will also be wider, indirect effects as a result of these direct effects, which may be experienced at a wider scale, including effects on the catchments of affected community facilities, wider effects on public service provision, and other indirect effects on communities related to construction activity and the operational DCO Project. These require a wider study area, to reflect the wider population potentially affected and providers, users and guardians of community facilities.
- 9.4.5 The community assessment will draw on other environmental assessments – such as noise, transport, air quality and landscape and visual amenity assessments – to identify any residual significant effects on community receptors identified, and as such will refer to the study area for potential significant effects identified by these and other relevant assessments.

Inner study area

- 9.4.6 The most local effects of the DCO Project on communities will be related to the displacement of (and changes to access to) homes, businesses, community facilities (including sports and leisure facilities) and publicly open recreational spaces and routes. The inner study area is defined as the area in which these local effects may occur, noting that there is a slight difference in the study area for the community facilities (including sports and leisure facilities) and recreational spaces and routes as explained further in paragraphs 9.4.7-9.4.11.
- 9.4.7 The inner study area developed for the community assessment is made up of ‘community areas’ using administrative boundaries at the finest possible spatial scale (output areas) for which National Statistics¹⁰ (e.g. Census data) are produced. The spatial output areas used to set this inner study area (as well as which Local Planning Authority each community area is located in) are set out in Table 9.2.1 of **Appendix 9.2: People, place and community baseline**. This enables the assessment to draw on the most current, accurate and detailed

¹⁰ Statistics that are produced by crown bodies, those acting on behalf of crown bodies, or those specified in statutory orders, as defined in the Statistics and Registration Service Act 2007.



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demographic, housing and economic datasets available. It also allows for the definition of individual community areas that reflect distinct communities within the study area.

- 9.4.8 This study area is determined for the assessment of effects on communities and physical community facilities, including sports and leisure facilities (indoor and outdoor sport, allotments and equipped play areas), set at a community-level, based on administrative areas that reflect individual communities around the airport. It is therefore built up with blocks of administrative geography as demographic data, as well as spatial location of facilities.
- 9.4.9 These community study areas are the most relevant for the assessment of impacts on these facilities as they capture the location and characteristics of any home, resident or physical community facility potentially displaced by the DCO Project.
- 9.4.10 The community areas are shown on Figure 9.1 (blue boundary lines). Figure 9.1 also shows the study area for the assessment of effects on recreational spaces and routes (purple dotted boundary line). This boundary is different to the community areas, as it is defined by the extent of recreational spaces (such as the Cone Valley Regional Park, the Crane Valley and Hounslow Heath), and established networks and connectivity like Public Rights of Way (PRoW) (such as the London Loop long distance footpath) that may be affected in terms of displacement, loss, severance, access or amenity as a result of the DCO Project.
- 9.4.11 The study area boundary for recreational spaces and routes has been drawn to encompass adjacent areas to which directly affected areas may have a physical or functional connection. Where appropriate, the study area for recreational spaces and routes utilises physical break-lines such as the River Thames or railway lines. The boundary also reflects potential opportunities for new linkages / recreational routes.

Wider study area

- 9.4.12 The effect on communities extends beyond direct change, loss or displacement of community facilities around the Airport. It also includes:
1. The effects on the users of those community facilities directly affected
 2. Effects on the providers and guardians of community facilities and public services (for example, local planning and regulatory authorities and other public bodies).
- 9.4.13 As such, a wider study area will be used when assessing wider effects on the provision of public and regulatory services where relevant. This study area includes Local Planning Authorities who are members of HSPG, or who are geographically located within the area covered by Local Planning Authorities who



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are HSPG members, and local authorities within which the Project resides. The reasons for this include:

1. HSPG's remit is to "*bring together a range of public bodies and stakeholders responsible for the area most directly impacted by the future operation of Heathrow Airport*"¹¹ – membership of the HSPG is not limited and therefore the scope of this study area can change to reflect the extent of its membership and spatial extent
2. The group has established a sub group to focus on addressing environmental (including community) impacts of Heathrow expansion and mitigation proposals¹²
3. Local Planning Authorities are the key providers, guardians and representatives of public services and community facilities provided to their residents.

9.4.14 This wider study area – the 'core study area' is shown in Figure 10.1 in **Chapter 10: Economics and employment**.

9.5 Sources of data used in scoping

Desk study

9.5.1 The data used to inform the scope of assessment includes those datasets and sources summarised in Table 9.3. **Appendix 9.2: People, place and community baseline** provides detailed baseline information for the inner and wider study areas.

Table 9.3 Data sources used for scoping

Source	Data
Office of National Statistics ¹³	Including (but not limited) to National Statistics and datasets such as Census (2011) and the Annual Population Survey (2017)
Ordnance Survey (OS) data ¹⁴	Including VectorMap and other OS open products to identify land use, property and community facilities

¹¹ Welcome to the HSPG <http://www.heathrowstrategicplanninggroup.com/> (accessed 03 May 2018)

¹² HSPG/Grimshaw, HSPG Vision and Principles, 2016

¹³ Nomis official labour market statistics www.nomisweb.co.uk (accessed 03 May 2018)

¹⁴ OS VectorMap Local www.ordnancesurvey.co.uk/business-and-government/products/vectormap-local.html (accessed 03 May 2018)



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Source	Data
Online maps and aerial photograph resources ¹⁵¹⁶	Resources include GIS datasets for planning constraints and definitions of public open space
Sports England ¹⁷	Including Active Places database of sports facilities
Natural England ¹⁸ http://webarchive.nationalarchives.gov.uk	Natural Green Space Standards
Studies from Local Planning Authorities, Local / Regional Government and other Public Bodies including ^{19,20,21,22,23,24,25,26,27}	Strategies, assessments and other published evidence relating to community life and social cohesion, local provision of community facilities including sport and leisure, public services, and housing – for example, Joint Strategic Needs Assessments. Published open space strategies and assessments including relevant open space standards Land use surveys Publicly available user surveys capturing usage data for any recreational spaces and routes PRoW definitive maps
Local Plans and the London Plan, and any Supplementary Planning Guidance and evidence base documents	Standards for provision, and designations of land uses and community facilities such as play areas and allotments. These plans provide information that will be drawn upon by the assessment including: Categorisation, hierarchy and standards for provision of public space and some community facilities (e.g. London Plan Table 7.2) Evidence base documents will identify relevant information with regard to setting the baseline position and sensitivity of receptors – for example pre-existing disparity or scarcity in provision of public open spaces or facilities.
All London Green Grid (ALGG) ²⁸	Resources including ALGG functions and principles, and relevant Green Grid Areas data including the Area 10 Framework (River Colne and Crane). The data will be used to identify where there is under and over provision of spaces and routes.

¹⁵ Bing <https://www.bing.com/maps> (accessed 03 May 2018)

¹⁶ Magic www.magic.gov.uk (accessed 03 May 2018)

¹⁷ Active places data platform <https://datapatform.activeplacespower.com/> (accessed 03 May 2018)

¹⁸ UK Government Web Archive <http://webarchive.nationalarchives.gov.uk> (accessed 03 May 2018)

¹⁹ London Borough of Hillingdon www.hillingdon.gov.uk (accessed 03 May 2018)

²⁰ Spelthorne Borough Council www.spelthorne.gov.uk (accessed 03 May 2018)

²¹ London Borough of Hounslow www.hounslow.gov.uk (accessed 03 May 2018)

²² South Bucks District Council <http://www.southbucks.gov.uk/> (accessed 03 May 2018)

²³ Slough Borough Council <https://www.slough.gov.uk/> (accessed 03 May 2018)

²⁴ Buckinghamshire County Council www.buckscc.gov.uk (accessed 03 May 2018)

²⁵ Surrey County Council www.surreycc.gov.uk (accessed 03 May 2018)

²⁶ Colne Valley Regional Park www.colnevalleypark.org.uk (accessed 03 May 2018)

²⁷ Greater London Authority www.london.gov.uk (accessed 03 May 2018)

²⁸ All London Green Grid <https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/all-london-green-grid> (accessed 03 May 2018)



Source	Data
Countryside and Rights of Way Act 2000	Resources include open access land, Public Rights of Way and countryside recreation

Baseline surveys

- 9.5.2 Initial, informal site visits have been undertaken in the preparation of this Scoping Report, to sense-check the results of desk study outlined above. This included a review of community facilities within the inner study area and of recreation facilities, open spaces and routes within the recreational spaces and routes study area.

9.6 Baseline conditions

Population and demographics

- 9.6.1 The population of the inner study area is approximately 193,000 people²⁹. Within this area, communities have been identified based on the geographic location of homes, people and facilities within administrative areas (for data collection), and by Local Planning Authority (for service provision).
- 9.6.2 The following table summarises some of the demographic characteristics of the community areas shown in Figure 9.1, with full detail included in **Appendix 9.2 People, place and community baseline**. This information is primarily drawn from National Statistics data sources in order to provide consistency across study areas. However, as identified in Table 9.3 there are other data sources, some provided at different spatial scales and by different organisations, that will be relevant to the assessment and will be used to supplement National Statistics data sources (for example, Joint Strategic Needs Assessments)
- 9.6.3 The first row of Table 9.4 provides a summary of the characteristics of the entire inner study area.

²⁹ 2011 Census.



Table 9.4 Characteristics of inner study area and communities within it

Area	Summary of community characteristics ³⁰
Inner study area	<ul style="list-style-type: none"> • Population: 193,000 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 41,000 (21%) ○ 16-74: 143,000 (74%) ○ 75+: 9,440 (5%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 67% houses, 33% flats ○ 52% of households owner-occupied, 20% social rented, 24% private rented, 2% shared ownership, 1% living rent free ○ 15% of households in overcrowded accommodation • Qualifications: 20% of working-age residents hold no formal qualification, 38% GCSE/A Level, 28% further and higher education, 15% other qualifications • Occupation: 33% of working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 36% in Sales / Process / Elementary occupations
West Drayton	<ul style="list-style-type: none"> • Population: 16,700 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 3,970 (24%) ○ 16-74: 11,800 (70%) ○ 75+: 980 (6%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 67% houses, 32% flats ○ 51% of households owner-occupied, 27% social rented, 18% private rented, 3% shared ownership, 1% living rent free ○ 12% of households in overcrowded accommodation • Qualifications: 25% of working-age residents hold no formal qualification, 42% GCSE/A Level, 23% further and higher education, 10% other qualifications • Occupation: 34% of working-age residents in Management / Professional / Technical occupations, 36% in Admin / Skilled Trades / Services occupations, 31% in Sales / Process / Elementary occupations • Ethnicity: 66% White, 4% Mixed/multiple, 19% Asian/Asian British, 8% Black/Black British, 3% Other <p>Contains some areas of concentrated deprivation</p>
Hayes	<ul style="list-style-type: none"> • Population: 14,800 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 3,890 (26%) ○ 16-74: 10,300 (70%) ○ 75+: 550 (4%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 81% houses, 19% flats ○ 58% of households owner-occupied, 20% social rented, 20% private rented, 1% shared ownership, 1% living rent free

³⁰ Figures are rounded to three significant figures. Percentage are rounded to the nearest integer so may not sum to 100.



Area	Summary of community characteristics ³⁰
	<ul style="list-style-type: none"> ○ 18% of households in overcrowded accommodation • Qualifications: 22% of working-age residents hold no formal qualification, 41% GSCE/A Level, 23% further and higher education, 15% other qualifications • Occupation: 27% of working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 41% in Sales / Process / Elementary occupations • Ethnicity: 32% White, 4% Mixed/multiple, 48% Asian/Asian British, 12% Black/Black British, 5% Other <p>Contains some areas of concentrated deprivation</p>
Longford³¹	<ul style="list-style-type: none"> • Population: 250* (see footnote) • Age profile: <ul style="list-style-type: none"> ○ 0-15: 30 (10%) ○ 16-74: 210 (86%) ○ 75+: 9 (4%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 53% houses, 47% flats ○ 47% of households owner-occupied, 3% social rented, 48% private rented, 0% shared ownership, 2% living rent free ○ 9% of households in overcrowded accommodation • Qualifications: 15% of working-age residents hold no formal qualification, 38% GSCE/A Level, 35% further and higher education, 13% other qualifications • Occupation: 36% of working-age residents in Management / Professional / Technical occupations, 24% in Admin / Skilled Trades / Services occupations, 39% in Sales / Process / Elementary occupations • Ethnicity: 72% White, 3% Mixed/multiple, 16% Asian/Asian British, 5% Black/Black British, 4% Other
Harmondsworth	<ul style="list-style-type: none"> • Population: 1,850 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 350 (19%) ○ 16-74: 1,400 (75%) ○ 75+: 100 (6%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 84% houses, 16% flats ○ 57% of households owner-occupied, 12% social rented, 25% private rented, 1% shared ownership, 2% living rent free ○ 12% of households in overcrowded accommodation • Qualifications: 21% of working-age residents hold no formal qualification, 43% GSCE/A Level, 21% further and higher education, 15% other qualifications • Occupation: 25% of working-age residents in Management / Professional / Technical occupations, 32% in Admin / Skilled Trades / Services occupations, 43% in Sales / Process / Elementary occupations

³¹ The Longford community area covers two output areas. One of these contains the Colnbrook/Harmondsworth Immigration Removal Centre; to avoid this affecting demographic data, only census data from one output area (not containing the Centre) has been reported here for Longford data only; data for the inner study area as a whole is not affected.



Area	Summary of community characteristics ³⁰
	<ul style="list-style-type: none"> • Ethnicity: 60% White, 5% Mixed/multiple, 27% Asian/Asian British, 5% Black/Black British, 3% Other
Sipson	<ul style="list-style-type: none"> • Population: 970 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 220 (23%) ○ 16-74: 700 (72%) ○ 75+: 50 (5%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 88% houses, 11% flats ○ 47% of households owner-occupied, 12% social rented, 39% private rented, 1% shared ownership, 1% living rent free ○ 12% of households in overcrowded accommodation • Qualifications: 18% of working-age residents hold no formal qualification, 45% GCSE/A Level, 26% further and higher education, 11% other qualifications • Occupation: 29% of working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 41% in Sales / Process / Elementary occupations • Ethnicity: 62% White, 4% Mixed/multiple, 25% Asian/Asian British, 6% Black/Black British, 3% Other
Cranford Cross	<ul style="list-style-type: none"> • Population: 1,630 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 360 (22%) ○ 16-74: 1,210 (74%) ○ 75+: 60 (4%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 76% houses, 24% flats ○ 57% of households owner-occupied, 3% social rented, 38% private rented, 0% shared ownership, 1% living rent free ○ 19% of households in overcrowded accommodation • Qualifications: 13% of working-age residents hold no formal qualification, 35% GCSE/A Level, 30% further and higher education, 22% other qualifications • Occupation: 28% of working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 41% in Sales / Process / Elementary occupations • Ethnicity: 30% White, 4% Mixed/multiple, 54% Asian/Asian British, 5% Black/Black British, 6% Other
Cranford	<ul style="list-style-type: none"> • Population: 6,760 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 1,370 (20%) ○ 16-74: 5,100 (75%) ○ 75+: 290 (4%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 73% houses, 26% flats ○ 54% of households owner-occupied, 17% social rented, 27% private rented, 0% shared ownership, 1% living rent free



Area	Summary of community characteristics ³⁰
	<ul style="list-style-type: none"> ○ 19% of households in overcrowded accommodation • Qualifications: 18% of working-age residents hold no formal qualification, 35% GSCE/A Level, 27% further and higher education, 20% other qualifications • Occupation: 27% of working-age residents in Management / Professional / Technical occupations, 27% in Admin / Skilled Trades / Services occupations, 45% in Sales / Process / Elementary occupations • Ethnicity: 22% White, 3% Mixed/multiple, 65% Asian/Asian British, 6% Black/Black British, 5% Other <p>Contains areas of concentrated deprivation</p>
Heston	<ul style="list-style-type: none"> • Population: 36,200 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 7,700 (21%) ○ 16-74: 26,800 (74%) ○ 75+: 1,670 (5%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 67% houses, 33% flats ○ 54% of households owner-occupied, 22% social rented, 22% private rented, 1% shared ownership, 1% living rent free ○ 18% of households in overcrowded accommodation • Qualifications: 18% of working-age residents hold no formal qualification, 35% GSCE/A Level, 30% further and higher education, 17% other qualifications • Occupation: 34% of working-age residents in Management / Professional / Technical occupations, 30% in Admin / Skilled Trades / Services occupations, 36% in Sales / Process / Elementary occupations • Ethnicity: 23% White, 3% Mixed/multiple, 62% Asian/Asian British, 7% Black/Black British, 5% Other <p>Contains areas of concentrated deprivation</p>
Hounslow (Central and South)	<ul style="list-style-type: none"> • Population: 26,600 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 5,010 (19%) ○ 16-74: 20,200 (76%) ○ 75+: 1,360 (5%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 64% houses, 36% flats ○ 53% of households owner-occupied, 12% social rented, 30% private rented, 3% shared ownership, 1% living rent free ○ 16% of households in overcrowded accommodation • Qualifications: 14% of working-age residents hold no formal qualification, 32% GSCE/A Level, 39% further and higher education, 15% other qualifications • Occupation: 41% of working-age residents in Management / Professional / Technical occupations, 30% in Admin / Skilled Trades / Services occupations, 29% in Sales / Process / Elementary occupations • Ethnicity: 40% White, 4% Mixed/multiple, 5% Asian/Asian British, 5% Black/Black British, 3% Other <p>Contains areas of concentrated deprivation</p>



Area	Summary of community characteristics ³⁰
Hounslow (West and Heath)	<ul style="list-style-type: none"> • Population: 33,800 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 7,100 (21%) ○ 16-74: 25,300 (75%) ○ 75+: 1,390 (4%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 60% houses, 40% flats ○ 43% of households owner-occupied, 25% social rented, 29% private rented, 2% shared ownership, 1% living rent free ○ 21% of households in overcrowded accommodation • Qualifications: 17% of working-age residents hold no formal qualification, 32% GCSE/A Level, 32% further and higher education, 18% other qualifications • Occupation: 33% of working-age residents in Management / Professional / Technical occupations, 28% in Admin / Skilled Trades / Services occupations, 39% in Sales / Process / Elementary occupations • Ethnicity: 27% White, 3% Mixed/multiple, 58% Asian/Asian British, 7% Black/Black British, 4% Other <p>Contains areas of concentrated deprivation</p>
Feltham North	<ul style="list-style-type: none"> • Population: 11,600 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 2,310 (20%) ○ 16-74: 8,480 (73%) ○ 75+: 780 (7%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 72% houses, 28% flats ○ 59% of households owner-occupied, 22% social rented, 16% private rented, 1% shared ownership, 1% living rent free ○ 12% of households in overcrowded accommodation • Qualifications: 26% of working-age residents hold no formal qualification, 40% GCSE/A Level, 21% further and higher education, 13% other qualifications • Occupation: 27% of working-age residents in Management / Professional / Technical occupations, 34% in Admin / Skilled Trades / Services occupations, 39% in Sales / Process / Elementary occupations • Ethnicity: 61% White, 4% Mixed/multiple, 27% Asian/Asian British, 6% Black/Black British, 2% Other <p>Contains areas of concentrated deprivation</p>
Bedfont	<ul style="list-style-type: none"> • Population: 12,700 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 2,820 (22%) ○ 16-74: 9,160 (72%) ○ 75+: 720 (6%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 67% houses, 33% flats ○ 48% of households owner-occupied, 27% social rented, 16% private rented, 7% shared ownership, 1% living rent free ○ 10% of households in overcrowded accommodation



Area	Summary of community characteristics ³⁰
	<ul style="list-style-type: none"> • Qualifications: 24% of working-age residents hold no formal qualification, 44% GCSE/A Level, 20% further and higher education, 12% other qualifications • Occupation: 29% of working-age residents in Management / Professional / Technical occupations, 35% in Admin / Skilled Trades / Services occupations, 37% in Sales / Process / Elementary occupations • Ethnicity: 64% White, 4% Mixed/multiple, 23% Asian/Asian British, 7% Black/Black British, 2% Other <p>Contains areas of concentrated deprivation</p>
Stanwell	<ul style="list-style-type: none"> • Population: 14,600 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 2,970 (20%) ○ 16-74: 10,600 (73%) ○ 75+: 950 (6%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 69% houses, 31% flats ○ 60% of households owner-occupied, 23% social rented, 13% private rented, 3% shared ownership, 1% living rent free ○ 7% of households in overcrowded accommodation • Qualifications: 25% of working-age residents hold no formal qualification, 48% GCSE/A Level, 20% further and higher education, 8% other qualifications • Occupation: 33% of working-age residents in Management / Professional / Technical occupations, 35% in Admin / Skilled Trades / Services occupations, 32% in Sales / Process / Elementary occupations • Ethnicity: 79% White, 3% Mixed/multiple, 14% Asian/Asian British, 3% Black/Black British, 1% Other <p>Contains areas of concentrated deprivation</p>
Stanwell Moor	<ul style="list-style-type: none"> • Population: 1,370 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 250 (18%) ○ 16-74: 1,080 (79%) ○ 75+: 40 (3%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 84% houses, 16% flats ○ 73% of households owner-occupied, 7% social rented, 19% private rented, 1% shared ownership, 1% living rent free ○ 8% of households in overcrowded accommodation • Qualifications: 21% of working-age residents hold no formal qualification, 53% GCSE/A Level, 18% further and higher education, 8% other qualifications • Occupation: 29% of working-age residents in Management / Professional / Technical occupations, 40% in Admin / Skilled Trades / Services occupations, 31% in Sales / Process / Elementary occupations • Ethnicity: 78% White, 4% Mixed/multiple, 14% Asian/Asian British, 2% Black/Black British, 2% Other
Poyle	<ul style="list-style-type: none"> • Population: 1,730 • Age profile:



Area	Summary of community characteristics ³⁰
	<ul style="list-style-type: none"> ○ 0-15: 290 (17%) ○ 16-74: 1,380 (80%) ○ 75+: 60 (3%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 68% houses, 32% flats ○ 55% of households owner-occupied, 3% social rented, 41% private rented, 1% shared ownership, 1% living rent free ○ 11% of households in overcrowded accommodation • Qualifications: 15% of working-age residents hold no formal qualification, 47% GCSE/A Level, 25% further and higher education, 13% other qualifications • Occupation: 32% of working-age residents in Management / Professional / Technical occupations, 33% in Admin / Skilled Trades / Services occupations, 35% in Sales / Process / Elementary occupations • Ethnicity: 58% White, 3% Mixed/multiple, 32% Asian/Asian British, 5% Black/Black British, 2% Other
Colnbrook	<ul style="list-style-type: none"> • Population: 1,840 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 390 (21%) ○ 16-74: 1,390 (76%) ○ 75+: 60 (3%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 55% houses, 45% flats ○ 34% of households owner-occupied, 26% social rented, 34% private rented, 5% shared ownership, 1% living rent free ○ 9% of households in overcrowded accommodation • Qualifications: 20% of working-age residents hold no formal qualification, 46% GCSE/A Level, 22% further and higher education, 12% other qualifications • Occupation: 36% of working-age residents in Management / Professional / Technical occupations, 32% in Admin / Skilled Trades / Services occupations, 32% in Sales / Process / Elementary occupations • Ethnicity: 74% White, 4% Mixed/multiple, 15% Asian/Asian British, 6% Black/Black British, 2% Other <p>Contains areas of concentrated deprivation</p>
Brands Hill	<ul style="list-style-type: none"> • Population: 2,590 • Age profile: <ul style="list-style-type: none"> ○ 0-15: 610 (23%) ○ 16-74: 1,930 (74%) ○ 75+: 60 (2%) • Housing: <ul style="list-style-type: none"> ○ Stock comprises 67% houses, 33% flats ○ 53% of households owner-occupied, 13% social rented, 32% private rented, 1% shared ownership, 1% living rent free ○ 10% of households in overcrowded accommodation • Qualifications: 16% of working-age residents hold no formal qualification, 44% GCSE/A Level, 26% further and higher education, 14% other qualifications



Area	Summary of community characteristics ³⁰
	<ul style="list-style-type: none"> • Occupation: 31% of working-age residents in Management / Professional / Technical occupations, 33% in Admin / Skilled Trades / Services occupations, 36% in Sales / Process / Elementary occupations • Ethnicity: 49% White, 4% Mixed/multiple, 35% Asian/Asian British, 9% Black/Black British, 3% Other <p>Contains areas of concentrated deprivation</p>

Community facilities

9.6.4 A desk study has been undertaken to identify baseline receptors and community resources in the community areas (inner study area).

9.6.5 **Appendix 9.2** sets out details of community facilities within the inner study area. These facilities include:

1. Schools, nurseries, children's centres and other children's facilities
2. Adult education centres, libraries and other education facilities
3. Community centres and halls
4. Social care facilities such as care homes and hospices
5. Healthcare facilities including GPs, dentists and pharmacies
6. Community-facing businesses such as post offices and pubs
7. Places of worship
8. Sport and leisure facilities (indoor and outdoor sports facilities and playing pitches, allotments, private angling clubs and equipped play areas including those located within wider recreational spaces).

Recreational spaces and routes

9.6.6 A desk study has been undertaken to identify baseline receptors and resources that would potentially:

1. Experience direct effects, e.g. loss, relocation or change in access to a resource
2. Experience indirect effects, e.g. as a result of increased usage or deferred usage due to the loss, relocation or change in access to resources directly affected.



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- 9.6.7 Consideration has also been given to how resources combine to form networks of green infrastructure (e.g. as identified in the All London Green Grid³² and other relevant green infrastructure policy documents³³) and the extent to which the resources are publicised/promoted. The data from these documents also helps identify areas of under and over provision which will inform the assessment.
- 9.6.8 The recreational spaces and routes included in the baseline are set out in **Appendix 9.3: Resources and receptors identified within the recreational spaces and routes study area.**
- 9.6.9 Categories of recreational receptors identified include:
1. Recreational walkers (including dog walkers), runners and joggers
 2. Recreational cyclists
 3. Children and young people using play facilities
 4. Horse riders and other equestrian users
 5. Anglers (those using publicly accessible areas)
 6. Bird watchers
 7. Canoeists, paddlers, swimmers and divers (those using publicly accessible areas)
 8. People involved in contemplation at churchyards, cemeteries, etc
 9. Any other people using public open spaces for recreational purposes e.g. reading, eating, meditation, etc.
- 9.6.10 The above receptors include people and groups of people who make use of the defined recreational spaces and routes. They are likely to include local residents and visitors; individuals and groups.
- 9.6.11 The desk study identified a number of different typologies of recreational spaces and routes. These typologies are based on those defined in the former PPG17³⁴, and these typologies will be used in the EIA. The typologies of the resources identified within the study area are set out below.

³² All London Green Grid <https://www.london.gov.uk/what-we-do/environment/parks-green-spaces-and-biodiversity/all-london-green-grid> (accessed 03 May 2018)

³³ All London Green Grid Area Framework <https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/all-london-green-grid-area-framework> (accessed 03 May 2018)
<https://www.london.gov.uk/WHAT-WE-DO/environment/environment-publications/all-london-green-grid-area-framework> (accessed 03 May 2018)

³⁴ Department for Communities and Local Government, Planning Policy Guidance 17: Planning for Open space, Sport and Recreation, 2006 – this document has been replaced by the NPPF, however, it is referenced in policy documents as it provides the typologies of recreational spaces.



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Recreational spaces

- 9.6.12 The different types of recreational spaces, identified in the baseline include:
1. Parks and gardens
 2. Natural and semi-natural green spaces
 3. Green corridors
 4. Amenity green spaces with or without play facilities
 5. Outdoor play provision for children and teenagers
 6. Cemeteries and churchyards
 7. Open access land
 8. Waterbodies.
- 9.6.13 Spaces with a restricted access (i.e. access through payment of a fee such as a registered park or garden) will be included in the recreational spaces and routes assessment. Spaces that are not available for use by the general public (such as private sports facilities and allotments) and have no public access have not been included in the recreational spaces and routes baseline, but are instead considered in the assessment of community facilities as set out in paragraph 9.6.5.

Recreational routes

- 9.6.14 The different types of recreational routes identified in the baseline include:
1. PRow which will include footpaths, bridleways and byways
 2. Permissive routes
 3. Public highways identified as forming part of a promoted recreational route.
- 9.6.15 The above routes include both nationally, regionally and locally promoted walking routes and nationally, regionally and locally promoted recreational cycle routes.
- 9.6.16 Cycle routes that are promoted for use by commuters have not been included in the baseline and are excluded from the assessment. Effects on commuter cyclists will be considered in the Transport Assessment (TA) (refer to **Chapter 17: Traffic and transport**).

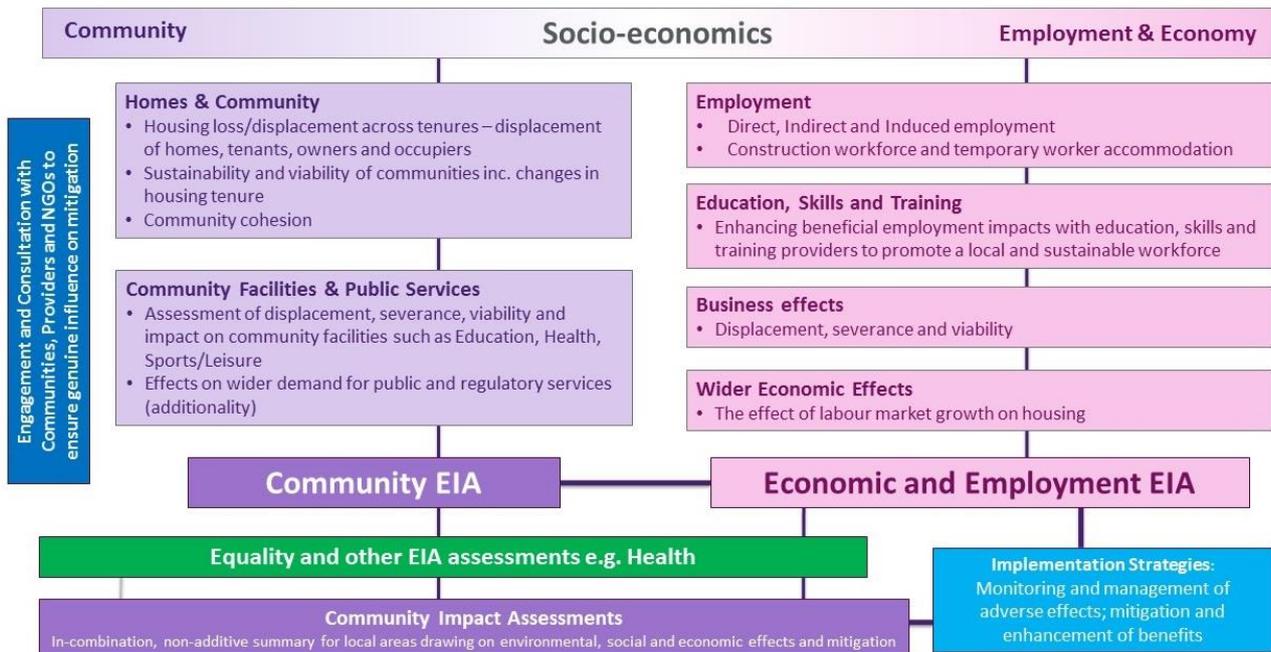
9.7 Likely significant effects requiring assessment

- 9.7.1 Graphic 9.1 identifies the proposed key components of the socio-economic impact assessment, with the effective split between community (this chapter) and **Chapter 10: Economics and employment**. Graphic 9.1 also shows how the



community and economics and employment assessments interact with each other and with other environmental assessments. The community impact assessments will provide the in-combination assessment as described in Section 4.7: In-combination effects.

Graphic 9.1 Key components of community and economics and employment assessments



9.7.2 Table 9.5 outlines the effects that may arise as a result of the DCO Project, identifying the activity or activities causing each of the effects, and the receptors that could potentially be affected. Most of the effects detailed in Table 9.5 are:

1. Direct and indirect effects related to potential changes in homes and communities and their associated networks of public service and community facility provision as a result of the extent of land required for the DCO Project
2. The potential permanent and temporary effects on existing homes, communities, residents, community facilities and recreational spaces and routes resulting from this land take (e.g. changes to access).

9.7.3 Effects associated with land use change (both temporary and permanent) begin during the construction phase, although it is noted that some effects begin during the construction phase and change during the operational phase. Other effects occur as a result of and throughout the operational phase.



Table 9.5 Likely significant community effects

Activity	Effect	Receptor
Construction and Operation		
Displacement/loss or other change to homes, community facilities (including sports and leisure facilities), community facing businesses, and recreational routes and spaces (including access and amenity) as a result of land use change	Potential effects related to the displacement of tenants and owners of residential property across all tenures as a result of the extent of land required by the DCO Project (both temporary and permanent land take), including transitional effects	Tenants and owners of residential property
	Potential temporary and permanent effects on the viability, sustainability, and accessibility of all existing and planned physical community facilities and public spaces and community-facing businesses ³⁵ and their users within the inner study area where they are displaced by the land needed for the DCO Project	Communities and community facilities and public services
	Potential temporary and permanent effects on the viability (functionality) or sustainability of existing recreational spaces and routes and the subsequent effect on users	Users of facilities and recreational spaces and routes including local residents, visitors and clubs/organisations
	Potential temporary and permanent effects on the viability, sustainability, accessibility of all physical community facilities and community-facing businesses within the inner study area where they are subject to changes in catchment or amenity (as identified through other environmental assessments or within the in-combination environmental effects in Section 4.7: In-combination effects) on their viability	Community facilities and public services
Temporary and permanent population and demographic change, including changes to communities as a result of displacement/loss of homes including Wider Property Offer uptake	Potential temporary and permanent effects on community cohesion and the nature of communities as a result of change in population characteristics and distribution of homes and physical facilities, including as a result of a temporary construction workforce, and at the operational phase compared with today and future baseline scenarios	Communities and community facilities and public services
	Potential temporary/permanent transitional effects on the provision of public services including regulatory and planning services (where relevant) across the wider study area	Users and providers of public services
	Potential permanent effects related to changes in the characteristics of communities around the Airport as a	Communities and community

³⁵ Including education and childcare, healthcare, community halls and other community resources, places of worship, sports and indoor and outdoor leisure/recreation facilities.



	result of loss and displacement of homes, and uptake of the Wider Property Offer which could result in a different tenure and demographic profile, and changes to demand for community facilities	facilities and public services
Operation		
Environmental effects on communities, community facilities (including sports and leisure facilities), community facing businesses, and recreational routes and spaces.	Potential permanent effects on the viability, sustainability, and accessibility of all physical community facilities and community-facing businesses within the inner study area where they are subject to changes in amenity (as identified through other environmental assessments or within the in-combination environmental effects in Section 4.7: In-combination effects during the operational phase).	Communities, community facilities and public services

9.8 Effects not requiring assessment

9.8.1 At this stage of the DCO Project development, no effects have been scoped out of the assessment.

9.9 Proposed approach to the assessment

9.9.1 This section sets out the approach to assessment of the significance of the effects identified in Section 9.7: Likely significant effects requiring assessment.

9.9.2 Community effects are partly determined by the nature of a development; the nature of the locality; the sensitivity of the receptor and policy decisions taken by key stakeholders (e.g. the developer’s policy on property acquisition and management, workforce recruitment, etc; and the policy positions and socio-economic objectives of local and regional authorities and agencies). These determinants need to be investigated thoroughly to clarify the likely set of key effects.

9.9.3 Methods for predicting and assessing effects will draw on existing policy, standards and guidance, analysis and methods established for other large infrastructure and development projects.

9.9.4 The final details of the assessment methodologies will be agreed with stakeholders during future engagement and through response to scoping.

9.9.5 The study areas are set out in Section 9.4 These will be kept under review and as the design and consultation processes progress, the Project is refined and related topic assessment study areas are confirmed, the study areas may evolve as appropriate.



- 9.9.6 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Additional baseline information required

- 9.9.7 Should the study areas change in response to the evolving design, the need for any additional baseline data for Community may be reviewed and updated.
- 9.9.8 Additional information relating to resources and receptors will be sought from a number of third party organisations including members of HSPG, other Local Planning Authorities, governmental and non-governmental organisations, and specific interest groups.
- 9.9.9 Any data collected to inform the assessment will be sense checked with Local Planning Authorities and individual operator contacts.
- 9.9.10 Additional baseline information required to undertake the community assessment, may include:
1. **Identification of the community groups, organisations and support networks** that operate in communities experiencing effects
 2. **Data related to the function, users, catchments, operational requirements and pre-existing constraints** of community facilities
 3. **Demographic information and sensitivities** related to occupants of homes in the Compulsory Purchase Zone (CPZ) and Wider Property Offer (WPO) zone, including owners and tenants
 4. **Information regarding existing sensitivities and important community receptors** within each community, gained through liaison with community groups
 5. **Emerging standards, research and policy** related to community facilities and public services
 6. **Walkover surveys** of the recreational spaces and routes within the agreed study area. An attribute table (provided in **Appendix 9.4: Recreational spaces and routes resource attribute table**) will be completed for every recreational space and route as part of the survey. The attribute tables will be completed using information obtained from the desk study and the walkover surveys. The contents of the attribute table were discussed with the HSPG in December 2017, and March 2018. Feedback was provided at the meeting which has now been reflected in the table in **Appendix 9.4**. The walkover surveys will seek to:
 - a. Verify the resources identified via desk studies



- b. Identify any additional resources not apparent from desk research
 - c. Assess the condition and context of the resources
 - d. Allow informed estimates to be made about likely levels and nature of use of the resources, where possible.
7. **Surveys of users of recreation facilities:** it is proposed to conduct a survey of users of key recreational routes and spaces within the agreed study area. The research will provide quantitative data on usage during a specific period when the surveys are undertaken (Spring bank holiday weekend (early May), early Summer (end of June), late Summer (end of August) and late Autumn (November)). The surveys range from term-time to holiday periods and include all times of the day (07:00 to 21:00) and cover weekdays and weekends. The research will also contribute to the greater understanding of the baseline in relation to the demographics of users and the nature of activities undertaken. The Spring bank holiday weekend surveys will be the initial user surveys, with subsequent surveys further informed by HCEB engagement and engagement with other stakeholders. The locations of the user surveys were discussed and agreed with the HSPG in December 2017 and March 2018, and include:
- a. Harmondsworth Moor
 - b. Sipson Recreation Ground
 - c. Harmondsworth Recreation Ground
 - d. Stanwell Moor Recreation Ground
 - e. Colne Valley Way, north-east of Colnbrook
 - f. Colne Valley Way, southern entrance of Staines Moor
 - g. Cranford Park and London Loop
 - h. Pippins Park, Poyle
 - i. Bedfont Lakes Country Park
 - j. Hounslow Heath
 - k. Colnbrook Recreation Ground
 - l. Stanwell Recreation Ground.
8. **Open Space Assessment (OSA):** a formal assessment of the quantity and quality of open space provision will be undertaken (outside of the EIA). This study will primarily inform the design process and overall green infrastructure strategy, but will also inform a part of the recreation and amenity assessment. The OSA will establish the level of existing provision (sufficiency or deficiency)



and will be used to aid the identification and evaluation of potential mitigation measures. The OSA will draw upon existing studies undertaken by authorities within an agreed study area where available. Common standards for provision of open space throughout the agreed study area will be developed in consultation with the HSPG.

Assessment years

- 9.9.11 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the community assessment specifically.

Baseline assessment years

- 9.9.12 The assessment of baseline conditions will be limited to the availability of data. Some datasets, like the 2011 Census, provide detailed spatial information and represent a reliable sample size, but by the time of assessment will be dated. Where possible other National Statistics and public datasets will be used to update 2011 Census data, but in some cases, this remains the most reliable and spatially detailed source.
- 9.9.13 This assessment will also consider a future baseline (refer to Section 4.8: Engagement for description of future baseline) based on projections of population change and demographic change, in order to consider the effects of the DCO Project on communities in the future compared to the characteristics of communities today. Projections of populations at interim assessment years across the study areas will be procured by the Applicant from reputable industry standard providers and the spatial scale, methodology and assumptions will be agreed with HSPG through regular engagement to ensure they are fit for purpose for this assessment, and consistent with future baseline assumptions for other assessments.

Construction assessment years

- 9.9.14 The ES will set out the anticipated construction programme in order to establish the intensity, scale and location of construction activity which will vary over the construction period. The assessment of construction effects will then relate to the programme described.
- 9.9.15 The key assessment years during the construction phase are anticipated to be related to:



1. Changes to environmental amenity during construction, and as such will be taken from the peak of adverse effects identified by other assessments (noise, air quality, landscape and visual amenity etc)
2. Potential requirement for temporary worker accommodation during construction, its phasing and peak occupancy
3. Phasing of demolition, re-provision (where appropriate) and construction activities - for the assessment of community sustainability and displacement effects, linked to mitigation and compensation identified through Heathrow's Property Policies
4. Interim years where environmental effects have the greatest potential to lead to community effects (i.e. maximum environmental effects).

Operation assessment years

- 9.9.16 The key assessment years during the operational phase are anticipated to be related to:
1. Potential changes to housing, population and demography as an indirect effect of the uptake of the Wider Property Offer and other changes to homes and population as a result of economic change
 2. Interim years during the operational phase where environmental effects have the greatest potential to lead to community effects (i.e. maximum environmental effects).

Construction and operation assessment methodology

Proposed methodology

- 9.9.17 The methodology for assessing potential likely significant effects during the construction and operation phases (listed in Table 9.5) for the assessment of community and recreation and amenity effects will include the following steps:
1. Identification of **receptors potentially affected** by the DCO Project, including homes, residents, communities, community facilities (including sports and leisure facilities), users and providers of public and recreational routes and open spaces. In order to understand the effects of the DCO Project on potential sensitive receptors, the assessment of temporary community effects, and permanent community effects related to changes in provision, access to and location of people, homes, communities and facilities/services will need to draw on information from:
 - a. Other environmental impact assessment topic assessments



- b. Heathrow's Transport Assessment and resulting Surface Access Strategy
 - c. The physical parameters of the DCO Project
 - d. Construction phasing and workforce requirements
 - e. Population and demographic change related to the CPZ and WPOZ.
2. Investigation of the **sensitivity of those receptors to change** by analysis of metadata – this will be influenced by desk-study, stakeholder engagement, public datasets and survey work
 3. Review of **policy, standards and guidance relevant to potential changes** that may occur to the receptors as a result of the DCO Project
 4. **Application of scenarios** to assess the range of likely significant effects that could occur, including loss/displacement, change to access and amenity, and development of mitigation strategies to avoid or reduce significant effects. Given the long timescales involved, there is the potential for variation in the effects experienced at different points in the DCO Project, during both construction and operation. There is also uncertainty in terms of the response of sensitive receptors to change, and therefore the long-term residual effects that may be experienced. In order to address this, an 'adaptive' assessment approach will be adopted. This involves considering 'ranges' and 'alternative scenarios' in the assessment to identify a range of possible outcomes. This will inform any mitigation identified that will then be subject to a 'plan-monitor-management' approach. This means that the DCO Project should be subject to regular monitoring, with mitigation reviewed and amended as required as new information becomes available.

9.9.18 When these scenarios have been identified, the following will be undertaken:

1. Engagement with users and operators to gain an understanding of sensitivities (including through the HSPG, HCEB and statutory consultation)
2. Identification of changes in individual communities, in the context of national, regional and local standards for access to facilities and local standards/deficits
3. Assessment of this in the context of current and future baselines for both population and facilities, applying the significance criteria outlined below.

9.9.19 The assessment will have regard to the potential inequity of effects and their significance to groups with protected characteristics as identified by the Equality Act 2010. This will include:

1. Current local standards and quantity, quality and adequacy of provision of community facilities, recreational routes and spaces, and public services



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2. Resource catchments
3. Local demographics.

9.9.20 A full assessment of effects on groups with protected characteristics (and other characteristics of socio-economic inequality as identified by the Equality Impact Assessment³⁶ that accompanies the revised draft ANPS) will be in the Equality Impact Assessment which is separate to the EIA.

Approach to assessment of significance for community

- 9.9.21 There is no UK legislation or government guidance that specifies the detailed content required for community or socio-economic assessments or provides appropriate standards and thresholds for the assessment of significance of effects.
- 9.9.22 Effects are broadly derived from the interaction between the **magnitude** of impacts and the **sensitivity** of the resources and receptors.
- 9.9.23 The main sensitive receptors for the community assessment are people and communities, community facilities, and public services at a number of spatial levels. It is not possible to ascribe a relative 'value' to each of these receptors as effects can be as significant to individuals and local communities as they are at the regional scale.
- 9.9.24 There will therefore be a focus on the **sensitivity** of each receptor, and, in particular on their capacity and ability to respond to change. The social and community environment is a dynamic and adaptive one with constant background change and turnover, for example people moving into and out of an area and changing jobs. Sensitivity is also subjective based on the value ascribed to a resource or receptor by communities.
- 9.9.25 The sensitivity of receptors is categorised as either 'High', 'Medium', or 'Low' using the criteria shown in Table 9.6.

Table 9.6 Sensitivity to change for community

Sensitivity	Criteria
High	Where a receptor has limited ability to respond to change (for example, where a community facility has limited capacity to respond to population or catchment change).
Medium	Where a receptor has some ability to respond to change.
Low	Where a receptor is particularly responsive to change or able to cope with change without substantial effects on existing status or viability.

³⁶ Department for Transport, Revised draft Airports National Policy Statement: Equality Assessment, October 2017



- 9.9.26 The baseline assessment will identify the sensitivity of each receptor (including the ability to respond to change) and then, where possible, the **magnitude** (scale) of likely impacts would then be benchmarked against this using quantitative information where possible, or qualitative assessment based on professional judgement.
- 9.9.27 The magnitude of change that may be experienced by receptors is categorised as either 'High', 'Medium', 'Low' or 'Negligible' using the criteria shown in Table 9.7.

Table 9.7 Magnitude of change for community

Sensitivity	Criteria
High	Where the effect has the potential to result in loss or substantial change to a receptor or resource (for example population, community facilities / social infrastructure and public services) at a given spatial scale.
Medium	Where the effect has the potential to result in noticeable change to a receptor or resource (for example population, community facilities / social infrastructure and public services) at a given spatial scale.
Low	Where the effect has a hardly perceptible change to a receptor or resource (for example population, community facilities / social infrastructure and public services) at a given spatial scale.
Negligible	Where the effect has no discernible change (e.g. within the margin of error) at a given spatial scale.

- 9.9.28 The magnitude and sensitivity assessments will also take into account embedded mitigation. The **significance** of effects will then be determined, taking into account the following factors:
1. The capacity of the relevant area, resource or receptor to absorb or respond to the impact, which may be influenced by the geographical extent of the receptor, and the context of the impact in terms of recent rates of change (i.e. the sensitivity), as set out in paragraphs 9.9.24-9.9.25
 2. The magnitude of the potential impact which may be influenced by the geographical extent of the impact, its permanence or temporary nature, the duration and reversibility of the impact (i.e. magnitude, as set out in paragraphs 9.9.26-9.9.27), and in the context of any embedded mitigation.
- 9.9.29 The **significance** of potential effects is determined through reference to the sensitivity of affected receptors, the magnitude of change experienced by those receptors, the nature of the effect and the nature of the affected resource. A matrix based on that shown in Table 4.1 of **Chapter 4: Approach to EIA scoping** is used to guide the determination by combining the sensitivity and magnitude of



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change for each receptor. Professional judgement and engagement with communities, community facilities and service providers will also influence the assessment.

- 9.9.30 Cumulative community effects resulting from the combination of effects from the Scheme and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

Approach to assessment of significance for recreation and amenity

- 9.9.31 There is no standard methodology for assessing the significance of effects of a development on recreation and amenity, so a bespoke approach has been adopted, drawing on professional experience and methodologies established in relation to other infrastructure projects. It is anticipated that the final details of this methodology will be agreed with stakeholders through future engagement.
- 9.9.32 The likely effects of the DCO Project on the recreation and amenity resource (and whether these are significant) will be determined through consideration of the **sensitivity** of each potentially affected receptor and the **magnitude of change** to that receptor's recreational amenity that may arise as a result of the construction and operation of the DCO Project.
- 9.9.33 The **sensitivity** of receptors is categorised as either 'High', 'Medium' or 'Low' using the criteria shown in Table 9.9.

Table 9.8 Sensitivity to change for recreation and amenity

Sensitivity	Criteria
High	Users identified as having a high priority (e.g. users of regional parks and nationally or regionally promoted long distance footpaths, trails and/ or cycle routes) and who are highly dependent on the recreation and amenity resources which the affected resource or facility has to offer because there are no alternative comparable resources available.
Medium	Users identified as having a medium priority (e.g. users of metropolitan and district parks and locally promoted long distance footpaths, trails and/ or cycle routes) and who are largely dependent on the recreation and amenity resources which the affected resource or facility has to offer because there are few alternative comparable resources available.
Low	Users identified as having a low priority (e.g. users of local parks and small open spaces and users of sections of the local PRoW network that do not form part of a promoted route) and who are not particularly dependent on the recreation and amenity resources which the affected resource or facility has to offer because there are numerous alternative comparable resources available.

- 9.9.34 The **magnitude of change** to recreation and amenity will be determined based upon an assessment of the predicted deviation from baseline conditions which



may arise as a result of the DCO Project. The magnitude of change that may be experienced by receptors is categorised as either 'High', 'Medium', 'Low' or 'Negligible' using the criteria shown in Table 9.9.

Table 9.9 Magnitude of change for recreation and amenity

Sensitivity	Criteria
High	Proposals would cause a substantial change to existing patterns and levels of use of recreation and amenity resources.
Medium	Proposals would cause a moderate change to existing patterns and levels of use of recreation and amenity resources.
Low	Proposals would cause a slight change to existing patterns and levels of use of recreation and amenity resources.
Negligible	No discernible changes in expected levels or patterns of use are expected.

9.9.35 The **significance** of potential effects is determined through reference to the sensitivity of affected receptors, the magnitude of change experienced by those receptors, the nature of the effect and the nature of the affected resource. A matrix based on that shown in Table 4.1 of **Chapter 4: Approach to EIA scoping** is used to guide the determination by combining the sensitivity and magnitude of change for each receptor. The table, however, is an aid to assessment and the process of significance evaluation involves the application of professional judgement.

9.9.36 Cumulative effects on recreation and amenity receptors resulting from the combination of effects from the Scheme and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

9.10 Approach to mitigation

9.10.1 The EIA will identify mitigation measures that will help to avoid, reduce or, where appropriate, mitigate and offset significant negative effects. Where positive effects are identified, enhancement measures may be identified where appropriate to secure the benefits.

9.10.2 Mitigation opportunities will continue to be identified during scheme development and consultation prior to the submission of the DCO application. The EIA process is iterative, which is likely to enable further refinement of the DCO Project, with the objective of avoiding or reducing significant negative environmental effects. Mitigation measures will be identified by regularly reviewing the likely significant



negative environmental effects identified during the ongoing assessment process and considering these at regular workshops with HSPG and other stakeholders.

- 9.10.3 Where practicable, appropriate and supported by community engagement and engagement with service providers, design modifications will be considered to avoid or reduce significant negative effects, i.e. embedded measures. This could include relocation of facilities or other mitigations. The development of design (both physical land requirements and operational procedures) has considered the determinants that influence local residents, community facilities, public services and recreational routes and spaces, such as the options for land required for expansion, surface access design to maintain community connectivity.
- 9.10.4 The revised draft ANPS requires:
- “Appropriate community compensation package, relevant to planning [proportionate to environmental impacts]. This will include financial compensation to residents who will see their homes compulsorily acquired, as well as ongoing financial compensation to the local community.”*
- 9.10.5 Heathrow has committed to a number of embedded measures through the Airports Commission process (including through Heathrow’s submission to the Airports Commission – ‘Taking Britain Further’³⁷) and through public consultation to avoid and reduce the scale of negative effects and enhance positive effects, including:
1. Property policies (including details of compensation package for residents within the CPZ and voluntary compensation package for residents in the WPOZ, along with hardship policies)
 2. Commitment to set up a Heathrow Community Engagement Board to ensure local communities can influence the planning process and direction of mitigation
 3. Commitment to a Community Mitigation Fund relevant to planning and the scale of impacts assessed.
- 9.10.6 These measures will help to compensate or mitigate negative effects, and enhance benefits where they arise. They will be secured through planning requirements where appropriate, and may be accompanied by implementation strategies in order to ensure that they are effective and fit for purpose, with long-term governance and monitoring safeguards.
- 9.10.7 The approach to mitigation of significant effects will draw upon engagement with communities, stakeholders and facilities directly affected where possible, and

³⁷ Heathrow Airport Limited, Taking Britain Further, 2014



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where effects are uncertain or may arise over time, an ‘adaptive’ approach to impact assessment and mitigation will be adopted, as described in Section 9.9.

- 9.10.8 The proposed mitigation measures will be described in the ES, together with the residual effects remaining after mitigation. Where the DCO Project is likely to improve environmental conditions (over and above the baseline), these effects will be identified as enhancements.
- 9.10.9 Mitigation measures related to the management of environmental factors on amenity during the construction phases (such as air quality and noise) will be set out in a draft Code of Construction Practice (CoCP).
- 9.10.10 The draft CoCP will also include measures to ensure community cohesion during the construction phase related to workforce management, access and design.
- 9.10.11 The mitigation of any significant effects related to temporary employment generation during the construction phase on the provision of public services will be limited to transitional effects, as temporary residents in private rented accommodation will be entitled to public services as a result of general taxation.



Chapter 10

Economics and employment



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10. ECONOMICS AND EMPLOYMENT

10.1 Introduction

- 10.1.1 This chapter describes the scope of the assessment as it relates to economics and employment. It is intrinsically linked to the assessment of effects on **Chapter 9: Community**. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 10.1.2 This chapter describes:
1. The economics and employment policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. The study areas for assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the DCO Project on economics and employment
 7. Effects not requiring assessment
 8. The proposed approach to the assessment
 9. Approach to mitigation of effects and enhancement of benefits.
- 10.1.3 The economics and employment assessment will identify temporary and permanent, positive and negative effects on business, employment, skills and the labour market, and the wider economy as a result of the construction and operation of the DCO Project. Where significant adverse effects have the potential to arise, the economics and employment assessment will identify mitigation measures.
- 10.1.4 This assessment will also include measures to secure and enhance positive effects of the DCO Project related to:
1. Employment and the labour market
 2. Education, training and skills
 3. Commercial activity including businesses, business rates, supply chain opportunities, and inward investment.
- 10.1.5 This assessment will draw on the outputs of other environmental topics where they have the same sensitive receptors as the economics and employment assessment



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(i.e. businesses). These other environmental topics are required to apply standard thresholds and criteria to identify the significance of environmental effects on receptors, and identify the approach and steps to avoid, minimise and mitigate to avoid or reduce the significance of the effects. Where proportionate and reasonable attempts at technical mitigation identified by those other assessments cannot reduce residual impacts to a less than significant level (e.g. where the scale of environmental effects following mitigation still means that a business cannot continue to operate effectively), the economic effect that remains on the receptor will be assessed by this assessment.

- 10.1.6 In addition, a project-level Equality Impact Assessment (EqIA) is being prepared to accompany the DCO application. The EqIA will focus on assessing impacts on the groups with protected characteristics defined in the Equality Act 2010 (and other characteristics of socio-economic inequality as identified by the Equality Impact Assessment¹ that accompanies the revised draft ANPS). The EqIA and economics and employment assessments share inputs such as demography and economic characteristics, where relevant, including social deprivation indicators such as low income, and inputs from stakeholder engagement. The economics and employment assessment will have regard to any differential and disproportionate effects on different groups with protected characteristics.

10.2 Policy and legislation

- 10.2.1 This section identifies the relevant topic specific policies that have informed the scope and, where relevant, the study area of the assessment presented in **Chapter 10: Economics and employment**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter. There is no other legislation relevant for consideration under this assessment over and above The Infrastructure Planning (EIA) Regulations ('the EIA Regulations').

Table 10.1 Policy relevant to economics and employment assessment

Policy	Relevance to assessment
Revised draft Airports National Policy Statement (ANPS)² (October 2017)	The revised draft ANPS sets out the framework for decision making on development consent applications for the DCO Project. It sets out the national economic case for the DCO Project in terms of gross domestic product (GDP) and employment generation.

¹ Department for Transport, Revised draft Airports National Policy Statement Equality Assessment, October 2017

² Department for Transport, Revised Draft Airports National Policy Statement: New Runway Capacity and Infrastructure at Airports in the South East of England, 2017



Policy	Relevance to assessment
	<p>In paragraphs 5.258-5.267 it outlines the applicant’s requirements for assessing effects on people and businesses in the local and regional economy, and identifies some opportunities and commitments for enhancing employment and skills benefits.</p> <p>Specifically, paragraph 5.263 of the ANPS requires the applicant to deliver 5,000 new apprenticeships as per public commitments. It also requires Heathrow to provide details of the timetable for providing the apprenticeships, the areas and skills to be covered, the breakdown between core airport and supply chain opportunities, the qualifications to be achieved and the proposed method for reporting progress.</p> <p>Paragraph 5.265 requires the applicant to show how these apprenticeship measures will be administered and enforced.</p>
<p>National Networks National Policy Statement (NN NPS)³</p>	<p>The NN NPS sets out the framework for decision making on development consent applications for strategic infrastructure projects related to road and rail. This includes the Government’s vision and strategic objectives for national networks to “<i>support a prosperous and competitive economy...[and deliver]...the capacity and connectivity and resilience to support national and local economic activity and facilitate growth and create jobs</i>” (Page 9).</p>
<p>National Planning Policy Framework (NPPF)⁴ (2012)</p>	<p>Sets out planning policy for England and places a general presumption in favour of sustainable development. Identifies three elements of sustainable development including “<i>an economic role - contributing to building a strong, responsive and competitive economy, by ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure.</i>”</p> <p>The NPPF outlines the Government’s commitment to securing economic growth in order to create jobs and prosperity, building on the country’s inherent strengths, and to meeting the twin challenges of global competition and of a low carbon future.</p> <p>It sets out the importance of business needs within local and regional economic markets and the importance of planning for economic development by providing for new jobs and promoting access to them.</p>

³ Department for Transport, National Policy Statement for National Networks, 2014

⁴ Department of Communities & Local Government, National Planning Policy Framework, 2012



Policy	Relevance to assessment
	A draft revised NPPF ⁵ is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard. The revised NPPF is likely to continue to support the social and economic role of development as set out above.
The London Plan⁶ and The London Plan (Draft for Consultation)⁷	The London Plan sets out the framework for development across London. It identifies population, housing and economic characteristics of London and its sub-regions and in particular sets out functional economic areas that have been used in this Scoping Report.
Non-statutory policy produced by Local Enterprise Partnerships (LEPs)	<p>LEPs are voluntary partnerships between Local Planning Authorities and businesses set up by the Government to help determine local economic priorities and lead economic growth and job creation within an area.</p> <p>They produce Strategic Economic Plans⁸ which helps to set out the context for business growth, investment and sector skills development.</p> <p>The extent of these areas relative to Heathrow's estimated functional economic market area has been used to define the study areas used in this Scoping Report:</p> <ol style="list-style-type: none"> 1. Thames Valley Berkshire 2. Buckinghamshire Thames Valley 3. Enterprise M3

10.2.2 Due regard will also be given to local policies and the Government's 25 year environment plan⁹ where they are relevant.

10.3 Stakeholder engagement

10.3.1 As a significant employer and influence on the labour market, business community and local community, Heathrow regularly engages with Local Planning Authority Economic Development Officers (including via a sub-group of the Heathrow Strategic Planning Group (HSPG)¹⁰, Local Education Authorities and education, skills and training providers and the business community regarding existing

⁵ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation 2018

⁶ Greater London Authority, The London Plan: The Spatial Development Strategy for Greater London, 2016 (consolidated with amendments since 2011)

⁷ Greater London Authority, The London Plan: The Spatial Development Strategy for Greater London, Draft for Public Consultation, 2017

⁸ Buckinghamshire Thames Valley Local Enterprise Partnership (LEP), Strategic Economic Plan Refresh (2016-2031), 2016; Thames Valley Berkshire LEP, Strategic Economic Plan (2015/16-2020/21), 2015; Enterprise M3 LEP, Strategic Economic Plan (2014-2020), 2014

⁹ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018

¹⁰ The membership of the HSPG is described in Section 4.9: Engagement



programmes of support and opportunities for enhancing any benefits of expansion. This existing programme of activities will continue and, where relevant to the scope of this assessment, be captured in the assessment.

- 10.3.2 Engagement specific to the EIA has commenced and will continue with the HSPG on a regular basis to discuss progress and seek to agree the principles of this assessment including the baseline, the approach to assessment of effects, and the type and scale of mitigation or enhancement that is appropriate and how to implement it. A summary of engagement undertaken to date with HSPG relating to this assessment is outlined in Table 10.2.
- 10.3.3 A list of other stakeholders with whom future engagement will be undertaken as part of the economics and employment assessment is also being developed. These stakeholders are described in paragraph 10.3.5.
- 10.3.4 In addition, engagement will be undertaken with and through the Heathrow Community Engagement Board (HCEB, which is described in Section 4.9: Engagement). The HCEB will play a key role in ensuring that communities are able to contribute effectively to the planning process and influence the delivery of the DCO Project.

Table 10.2 Engagement with stakeholders

Consultee	Engagement undertaken
HSPG	<p>An initial workshop was held with HSPG members in February 2018. This workshop introduced the Applicant’s technical assessment team to the HSPG and provided an overview on the scope of the economic and employment assessment including:</p> <ol style="list-style-type: none"> 1. The overall approach to and structure of socio-economic assessment as part of an application for a Development Consent Order (DCO), including the adaptive approach to assessment (refer to Section 10.9: Proposed approach to the assessment) 2. The types of effects and key issues that are likely to be considered in this assessment 3. The role of engagement 4. Broad indicative study areas for effects <p>Feedback was received on the topics discussed at the meeting. These comments were collated with Applicant responses, and set out in a Technical Note circulated to HSPG ahead of a second workshop in May 2018. This note is appended at Appendix 10.1: Community and Employment/Economic EIA Technical Note for HSPG (May 2018). Comments and responses in that note are reflected in this scoping chapter.</p> <p>A second workshop was held with HSPG members in May 2018. This workshop provided an opportunity for clarification of any comments received as set out in Appendix 10.1. The workshop included:</p>



Consultee	Engagement undertaken
	<ol style="list-style-type: none"> 1. An update to progress in developing the scope of the assessment since the previous meeting 2. The role of a Joint Evidence Base and Infrastructure Assessment in the assessment of socio-economic effects of the DCO Project 3. An update and review of the study areas to be used for the assessments 4. An overview of the types of significant effects, and their scale, to be included in the assessments (and to be scoped out, where relevant) 5. An overview of assessment years to be used in the assessment 6. A summary of HAL's ongoing work on employment and skills via the Skills Taskforce <p>The HSPG members provided verbal feedback and will respond to the Technical Note issued. The HSPG response will inform the scope of the assessment going forward.</p>

10.3.5 To ensure there is a thorough and robust approach to stakeholder engagement, additional stakeholders have been identified based on their location and the effects they are likely to experience. Engagement will reflect the scale of the study areas detailed in this chapter, which in turn are largely defined by or similar to the scale of HSPG membership. Stakeholders will include:

1. Community groups, charities and residents – primarily engaged via the HCEB and through direct engagement
2. Local businesses including airport-related businesses, other businesses and community-facing businesses like pubs and local shops, and other public facilities like schools and leisure centres – primarily engaged through the requirements of Heathrow Airport's Property Policies or through direct engagement
3. Education/skills/training providers, including national skills bodies such as the Construction Industry Training Board (in respect of construction workforce effects) – primarily engaged through Heathrow's existing relationships with local bodies
4. Representatives and coordinators of the business community including Chambers of Commerce, Confederation of British Industry (CBI), The Federation of Small Businesses (FSB) and individual businesses - primarily engaged through Heathrow's existing relationships with local bodies
5. Local Planning Authorities and other local, regional and national public and quasi-public bodies and service providers relevant to business, employment and the economy (including Local Enterprise Partnerships within the study areas) - primarily engaged through on-going engagement with HSPG.



10.4 Study areas

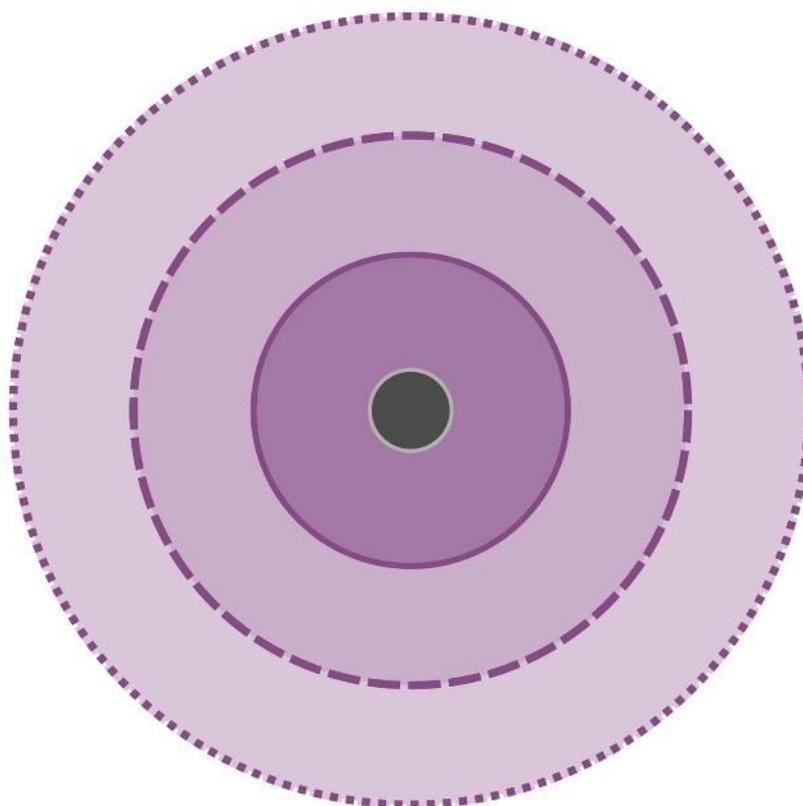
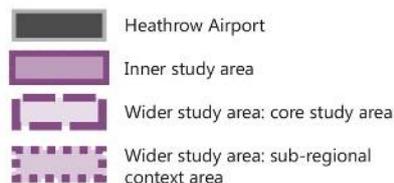
- 10.4.1 This section sets out the proposed study areas for the economics and employment assessment. As the design and consultation processes progress and the DCO Project is refined, the study areas may continue to evolve to accommodate any changes that are generated. If the study areas change, data collection may also be reviewed and updated.
- 10.4.2 The study areas for the assessment have been defined based on the anticipated scale of effects, the type of effects and engagement with stakeholders. The study areas are also influenced by professional judgement about the location of receptors (people, businesses and functional economic and labour markets (see below)) relative to the emerging extent of the DCO Project.
- 10.4.3 The study areas reflect two scales:
1. The **inner study area** considers effects of the physical expansion of Heathrow Airport and related infrastructure described in **Chapter 3: The DCO Project**, including the loss or displacement of businesses and commercial interests, land or property, and effects on the catchments of or access to businesses which are not lost or displaced
 2. The **wider study areas** consider wider effects of new economic activity on the labour market, employment and skills. These require wider study areas, to reflect the area of economic influence that Heathrow has now and will do in the future.
- 10.4.4 The study areas are cumulative – so wider study areas include the inner study area (in order to capture the effect of employment generated at the Airport in the wider context) – as set out in Graphic 10.1.



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Graphic 10.1 Cumulative nature of study areas



Inner study area

- 10.4.5 As set out in paragraph 10.4.3, this area is defined by the extent of land potentially required for the DCO Project, and therefore the direct and indirect effects on businesses and commercial interests, land or property, and effects on the catchments of or access to businesses which are not lost or displaced.
- 10.4.6 The inner study area comprises a number of specific community areas (as listed in Table 10.4) which are outlined in **Chapter 9: Community** (Figure 9.1).

Wider study areas

- 10.4.7 Wider study areas have been identified to capture the effects on Heathrow's current and future commuting area and the labour market in general as a result of the direct economic effects of the DCO Project (employment generation), along



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with any indirect, induced and some catalytic employment effects, and any subsequent effect on business, skills and education.

- 10.4.8 The wider study areas have been informed by MHCLG Planning Practice Guidance¹¹, which recommends assessment via ‘Functional Economic Market Areas’ (FEMAs). FEMAs are areas within which there is a relatively self-contained labour market, business market or local economy and may be in part determined by administrative areas and travel-to-work patterns. They are often comprised of Local Enterprise Partnerships (LEP) (groups of public bodies and business representatives in a spatial area), administrative boundaries like Local Planning Authorities, travel to work areas (Office for National Statistics (ONS) defined areas with a relatively self-contained workforce), catchments of facilities, and flows of goods, services and information.
- 10.4.9 The wider study areas are also influenced by potential workforce recruitment during the construction phase (the area within which construction workers are likely to commute from home to work on the DCO Project), and the scale of skills and training effects (likely to be assessed at a Local Planning Authority scale).
- 10.4.10 The wider study areas will include:
1. A ‘core study area’ defined as a specific Heathrow ‘catchment’, reflecting the immediate area where the greatest employment and property effects are likely to be felt. This is effectively considered the overall FEMA. It is based on the widest geographical extent of Local Planning Authorities with membership of HSPG, but has been validated by comparison to ONS Travel To Work areas and FEMAs established by each individual Local Planning Authority, which cover broadly the same spatial area
 2. A wider ‘sub-regional context area’ - The main function of this sub-regional area will be to provide an economic baseline and to consider its capacity to meet the ‘wider’ Heathrow generated growth. It is comprised of the ‘Elizabeth Line West’ area identified by the draft New London Plan⁷, along with three LEP areas (Thames Valley Berkshire, Enterprise M3 and Buckinghamshire Thames Valley)
 3. A Heathrow ‘commuting area’ for consideration of where directly employed labour and labour around the site will be drawn. This will be based on modelling of accessibility to Heathrow by the potential construction and operational workforce.
- 10.4.11 The core study area and sub-regional context area are shown in Figure 10.1 and Figure 10.2 respectively. The ‘commuting area’ will be defined through surface

¹¹ Ministry of Housing, Communities & Local Government, Planning Practice Guidance: Housing and Economic Development Needs Assessments, 2015



access modelling of the future baseline position (see Section 17.9: Proposed approach to assessment in **Chapter 17: Traffic and Transport**).

10.5 Sources of data used for scoping

Desk study

- 10.5.1 The data used to inform the scope of assessment is summarised in Table 10.3. **Appendix 9.2: People, place and community baseline** provides detailed baseline economic information for the inner and wider study areas.

Table 10.3 Data sources used for scoping

Source	Data
Office of National Statistics (Accessed via: www.nomisweb.co.uk)	Census data (2011) Department for Work and Pensions (DWP) data Annual Population Survey (2017) Business Register and Employment Survey (BRES) Inter-Departmental Business Register (IDBR)
Valuation Office Agency (https://www.gov.uk/government/organisations/valuation-office-agency)	Business rates data
Land Registry (https://eservices.landregistry.gov.uk)	Community-facing businesses
Local Planning Authorities	Published research and sector-specific data on skills, business, inward investment
Local Enterprise Partnerships	Published research and sector-specific data on skills, business, inward investment
Heathrow Airport Limited (www.heathrow.com)	Data held on employment, skills and training and business support Employee Survey (latest 2012/13) Feedback from ongoing activities including skills interventions and business support



10.6 Baseline conditions

Economic characteristics of inner study area

- 10.6.1 The population of the inner study area is approximately 193,000 people¹², and there are approximately 127,000 jobs¹³ here (including the Airport itself).
- 10.6.2 Table 10.4 summarises the economic characteristics of the community areas shown in Figure 9.1, with full detail included in **Appendix 9.2**. The first row of Table 10.4 provides a summary of the characteristics of the entire inner study area.

Table 10.4 Economic and labour market characteristics of inner study area

Area	Summary of economic characteristics ¹⁴
Inner study area	<ul style="list-style-type: none"> Working age population: 143,000 Qualifications: 20% of residents aged 16+ hold no formal qualification, 38% GSCE/A Level, 28% further and higher education, 15% other qualifications Economically active working-age residents: 103,000 (72%) Occupation: 33% of economically active, working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 36% in Sales / Process / Elementary occupations
West Drayton	<ul style="list-style-type: none"> Working age population: 11,800 Qualifications: 25% of residents aged 16+ hold no formal qualification, 42% GSCE/A Level, 23% further and higher education, 10% other qualifications Economically active working-age residents: 8,400 (71%) Occupation: 34% of economically active, residents aged 16+ in Management / Professional / Technical occupations, 36% in Admin / Skilled Trades / Services occupations, 31% in Sales / Process / Elementary occupations
Hayes	<ul style="list-style-type: none"> Working age population: 10,300 Qualifications: 22% of residents aged 16+ hold no formal qualification, 41% GSCE/A Level, 23% further and higher education, 15% other qualifications Economically active working-age residents: 7,210 (70%) Occupation: 27% of economically active, working-age residents in Management / Professional / Technical occupations, 31% in Admin /

¹² 2011 Census <https://www.ons.gov.uk/census/2011census> (accessed 03 May 2018)

¹³ Business Register and Employment Survey, 2016

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/businessregisterandemploymentsurveybresprovisionalresults/provisionalresults2016revisedresults2015> (accessed 03 May 2018)

¹⁴ Figures are rounded to 3 significant figures. Percentage are rounded to the nearest integer so may not sum to 100.



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Area	Summary of economic characteristics ¹⁴
	Skilled Trades / Services occupations, 41% in Sales / Process / Elementary occupations
Longford¹⁵	<ul style="list-style-type: none"> Working age population: 214 Qualifications: 15% of residents aged 16+ hold no formal qualification, 38% GSCE/A Level, 35% further and higher education, 13% other qualifications Economically active working-age residents: 176 (82%) Occupation: 36% of economically active, working-age residents in Management / Professional / Technical occupations, 24% in Admin / Skilled Trades / Services occupations, 39% in Sales / Process / Elementary occupations
Harmondsworth	<ul style="list-style-type: none"> Working age population: 1,400 Qualifications: 21% of residents aged 16+ hold no formal qualification, 43% GSCE/A Level, 21% further and higher education, 15% other qualifications Economically active working-age residents: 1,040 (75%) Occupation: 25% of economically active, working-age residents in Management / Professional / Technical occupations, 32% in Admin / Skilled Trades / Services occupations, 43% in Sales / Process / Elementary occupations
Sipson	<ul style="list-style-type: none"> Working age population: 703 Qualifications: 18% of residents aged 16+ hold no formal qualification, 45% GSCE/A Level, 26% further and higher education, 11% other qualifications Economically active working-age residents: 549 (78%) Occupation: 29% of economically active, working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 41% in Sales / Process / Elementary occupations
Cranford Cross	<ul style="list-style-type: none"> Working age population: 1,210 Qualifications: 13% of residents aged 16+ hold no formal qualification, 35% GSCE/A Level, 30% further and higher education, 22% other qualifications Economically active working-age residents: 927 (77%) Occupation: 28% of economically active, working-age residents in Management / Professional / Technical occupations, 31% in Admin / Skilled Trades / Services occupations, 41% in Sales / Process / Elementary occupations
Cranford	<ul style="list-style-type: none"> Working age population: 5,100

¹⁵ The Longford community area covers two output areas. One of these contains the Colnbrook / Harmondsworth Immigration Removal Centre. To avoid this affecting demographic data, only census data from one output area (that not containing the Centre) has been reported here for Longford; data for the inner study area as a whole is not affected.



Area	Summary of economic characteristics ¹⁴
	<ul style="list-style-type: none"> • Qualifications: 18% of residents aged 16+ hold no formal qualification, 43% GSCE/A Level, 27% further and higher education, 20% other qualifications • Economically active working-age residents: 3,540 (69%) • Occupation: 27% of economically active, working-age residents in Management / Professional / Technical occupations, 27% in Admin / Skilled Trades / Services occupations, 45% in Sales / Process / Elementary occupations
Heston	<ul style="list-style-type: none"> • Working age population: 26,800 • Qualifications: 18% of residents aged 16+ hold no formal qualification, 35% GSCE/A Level, 30% further and higher education, 17% other qualifications • Economically active working-age residents: 18,300 (68%) • Occupation: 34% of economically active, working-age residents in Management / Professional / Technical occupations, 30% in Admin / Skilled Trades / Services occupations, 36% in Sales / Process / Elementary occupations
Hounslow (Central and South)	<ul style="list-style-type: none"> • Working age population: 20,200 • Qualifications: 14% of residents aged 16+ hold no formal qualification, 32% GSCE/A Level, 39% further and higher education, 15% other qualifications • Economically active working-age residents: 15,000 (74%) • Occupation: 41% of economically active, working-age residents in Management / Professional / Technical occupations, 30% in Admin / Skilled Trades / Services occupations, 29% in Sales / Process / Elementary occupations
Hounslow (West and Heath)	<ul style="list-style-type: none"> • Working age population: 25,300 • Qualifications: 17% of residents aged 16+ hold no formal qualification, 32% GSCE/A Level, 32% further and higher education, 18% other qualifications • Economically active working-age residents: 17,800 (70%) • Occupation: 33% of economically active, working-age residents in Management / Professional / Technical occupations, 28% in Admin / Skilled Trades / Services occupations, 39% in Sales / Process / Elementary occupations
Feltham North	<ul style="list-style-type: none"> • Working age population: 8,480 • Qualifications: 26% of residents aged 16+ hold no formal qualification, 40% GSCE/A Level, 21% further and higher education, 13% other qualifications • Economically active working-age residents: 6,060 (73%) • Occupation: 27% of economically active, working-age residents in Management / Professional / Technical occupations, 34% in Admin / Skilled Trades / Services occupations, 39% in Sales / Process / Elementary occupations



Area	Summary of economic characteristics ¹⁴
Bedfont	<ul style="list-style-type: none"> Working age population: 9,160 Qualifications: 24% of residents aged 16+ hold no formal qualification, 44% GSCE/A Level, 20% further and higher education, 12% other qualifications Economically active working-age residents: 6,750 (74%) Occupation: 29% of economically active, working-age residents in Management / Professional / Technical occupations, 35% in Admin / Skilled Trades / Services occupations, 37% in Sales / Process / Elementary occupations
Stanwell	<ul style="list-style-type: none"> Working age population: 10,600 Qualifications: 25% of residents aged 16+ hold no formal qualification, 48% GSCE/A Level, 20% further and higher education, 8% other qualifications Economically active working-age residents: 8,020 (75%) Occupation: 33% of economically active, working-age residents in Management / Professional / Technical occupations, 35% in Admin / Skilled Trades / Services occupations, 32% in Sales / Process / Elementary occupations
Stanwell Moor	<ul style="list-style-type: none"> Working age population: 1,080 Qualifications: 21% of residents aged 16+ hold no formal qualification, 53% GSCE/A Level, 18% further and higher education, 8% other qualifications Economically active working-age residents: 840 (77%) Occupation: 29% of economically active, working-age residents in Management / Professional / Technical occupations, 40% in Admin / Skilled Trades / Services occupations, 31% in Sales / Process / Elementary occupations
Poyle	<ul style="list-style-type: none"> Working age population: 1,380 Qualifications: 15% of residents aged 16+ hold no formal qualification, 47% GSCE/A Level, 25% further and higher education, 13% other qualifications Economically active working-age residents: 1,120 (81%) Occupation: 32% of economically active, working-age residents in Management / Professional / Technical occupations, 33% in Admin / Skilled Trades / Services occupations, 35% in Sales / Process / Elementary occupations
Colnbrook	<ul style="list-style-type: none"> Working age population: 1,390 Qualifications: 20% of residents aged 16+ hold no formal qualification, 46% GSCE/A Level, 22% further and higher education, 12% other qualifications Economically active working-age residents: 1,070 (77%) Occupation: 36% of economically active, working-age residents in Management / Professional / Technical occupations, 32% in Admin / Skilled Trades / Services occupations, 32% in Sales / Process / Elementary occupations



Area	Summary of economic characteristics ¹⁴
Brands Hill	<ul style="list-style-type: none"> • Working age population: 1,930 • Qualifications: 16% of residents aged 16+ hold no formal qualification, 44% GSCE/A Level, 26% further and higher education, 14% other qualifications • Economically active working-age residents: 1,500 (78%) • Occupation: 31% of economically active, working-age residents in Management / Professional / Technical occupations, 33% in Admin / Skilled Trades / Services occupations, 36% in Sales / Process / Elementary occupations
Iver and Richings Park	<ul style="list-style-type: none"> • Working age population: 1,790 • Qualifications: 13% of residents aged 16+ hold no formal qualification, 45% GSCE/A Level, 34% further and higher education, 7% other qualifications • Economically active working-age residents: 1,340 (75%) • Occupation: 52% of economically active, working-age residents in Management / Professional / Technical occupations, 32% in Admin / Skilled Trades / Services occupations, 16% in Sales / Process / Elementary occupations

Commercial property

10.6.3 A number of commercial interests will be directly affected by the land required for expansion and by other changes that are required (e.g. to road access). The extent of these will depend on the spatial scale of the DCO Project.

Labour market (wider study areas)

10.6.4 Wider study areas will be required to assess effects on the labour and housing markets as a result of direct, indirect and induced employment generation.

10.6.5 A summary of the economic and labour market characteristics of these areas is provided in Table 10.5 below.

Table 10.5 Economics characteristics of wider study areas

Area	Summary of economic characteristics ¹⁶
Core study area (aggregated Local Planning Authority areas)	<ul style="list-style-type: none"> • Total jobs: 872,000; key sectors: <ul style="list-style-type: none"> ○ Transport and Storage, 108,000 jobs (12%) ○ Business administration & support services, 95,000 jobs (11%) ○ Professional, scientific and technical, 89,000 jobs (10%)

¹⁶ Figures are rounded to 3 significant figures. Percentage are rounded to the nearest integer so may not sum to 100.



Area	Summary of economic characteristics ¹⁶
	<ul style="list-style-type: none"> • Total businesses: 83,000 • Total population: 1,520,000 • Working age population: 1,120,000 • Economically active population (2011): 809,000 (72%) <ul style="list-style-type: none"> ○ Of which unemployed: 47,000 (6%) • Claimant Count¹⁷, December 2017: 15,900 • Long-term unemployment (of JSA claimants): Less than 8 weeks (28%), 8 weeks to 6 months (30%), 6months to 1 year (16%), More than 1 year (25%) • Qualifications (highest level gained, residents aged 16+): <input type="checkbox"/> <ul style="list-style-type: none"> ○ No qualifications: 211,000 (17%) ○ GSCE/A Level equivalent: 467,000 (39%) ○ Further and higher education: 408,000 (34%) ○ Other qualifications: 127,000 (10%) • Occupation (working age residents in employment): <ul style="list-style-type: none"> ○ Management / Professional / Technical occupations: 346,000 (46%) ○ Admin / Skilled Trades / Services occupations: 222,000 (29%) ○ Sales / Process / Elementary occupations: 185,000 (25%) • Ethnicity: 62% White (862,000), 4% Mixed/multiple (50,000), 25% Asian/Asian British (347,000), 7% Black/Black British (91,000), 3% Other (44,000)
<p>Sub-regional context area (based on best-fit wards and LEP areas)</p>	<ul style="list-style-type: none"> • Total jobs: 2,080,000; key sectors: <ul style="list-style-type: none"> ○ Professional, scientific and technical, 231,000 jobs (11%) ○ Business administration & support services, 201,000 jobs (10%) ○ Health, 199,000 (10%) • Total businesses: 207,000 • Total population: 3,880,000 • Working age population: 2,840,000 • Economically active population (2011): 2,090,000 (74%) <ul style="list-style-type: none"> ○ Of which unemployed: 47,000 (5%) • Claimant Count, December 2017: 29,900 • Qualifications (highest level gained, residents aged 16+): <ul style="list-style-type: none"> ○ No qualifications: 515,000 (17%) ○ GSCE/A Level equivalent: 1,280,000 (41%) ○ Further and higher education: 1,100,000 (35%) ○ Other qualifications: 219,000 (7%) • Occupation (working age residents in employment):

¹⁷ The Claimant Count as defined by ONS measures the number of people claiming benefit principally for the reason of being unemployed. From April 2015, the Claimant Count includes all Universal Credit claimants who are required to seek work and be available for work, as well as all JSA claimants.

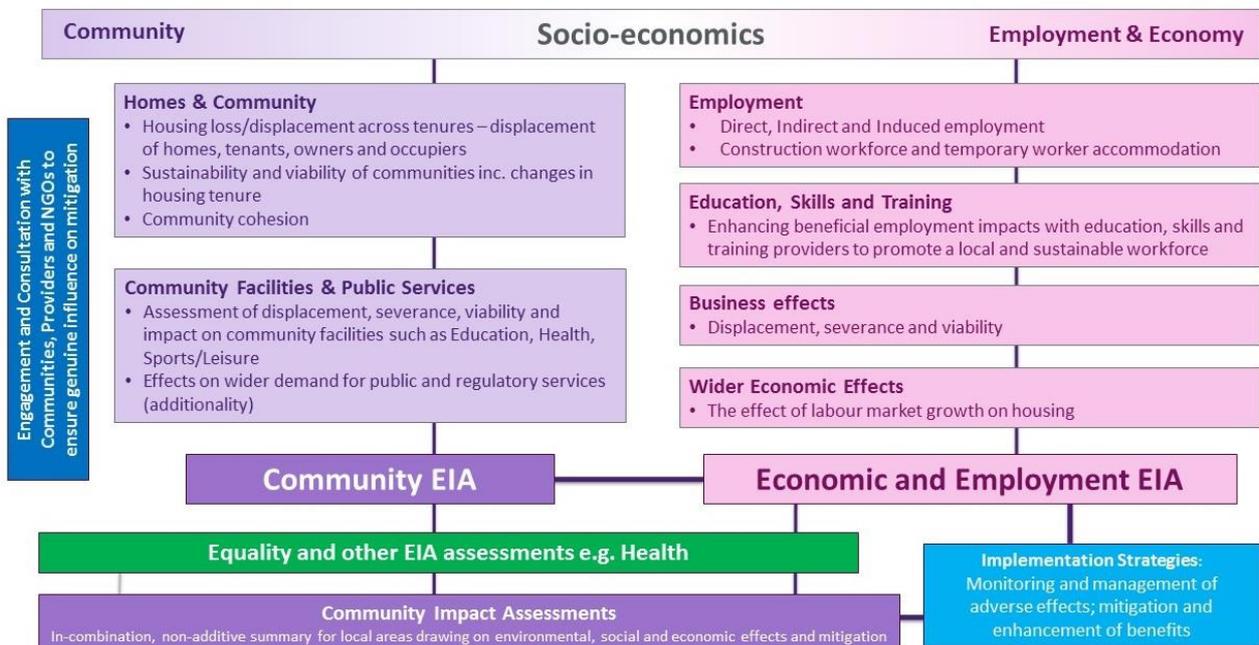


Area	Summary of economic characteristics ¹⁶
	<ul style="list-style-type: none"> ○ Management / Professional / Technical occupations: 978,000 (50%) ○ Admin / Skilled Trades / Services occupations: 577,000 (29%) ○ Sales / Process / Elementary occupations: 419,000 (21%)

10.7 Likely significant effects requiring assessment

10.7.1 Graphic 10.2 identifies the proposed key components of the socio-economic impact assessment, with the effective split between economics and employment (this chapter) and **Chapter 9: Community**. Graphic 10.2 also shows how the community and economics and employment assessments interact with each other and with other environmental assessments. The community impact assessments will provide the in-combination assessment as described in Section 4.7: In-combination effects.

Graphic 10.2 Key components of community and economic/employment assessments



10.7.2 With regard to the economics and employment assessment, Table 10.6 outlines the effects that may arise as a result of the DCO Project, identifying the activity or activities causing each of the effects, and the receptors that could potentially be affected.



Table 10.6 Likely significant economics and employment effects

Activity	Effect	Receptor
Construction		
Displacement/loss or other changes to land and property (including amenity and access) as a result of the land take	Potential temporary or permanent displacement of businesses or commercial activity including property, land and minerals	Local businesses and commercial activity
	Potential effects on sustainability or viability of businesses (including agricultural businesses) resulting from the DCO Project (such as temporary or permanent loss of catchment population, change in environment, or severance as a result of changes to access)	Local businesses and commercial activity
	Disruption to residents and their economic activity, through environmental changes and changes in access (e.g. severance and journey time) to/from employment locations	People and businesses
Changes to resources as a result of other environmental assessments	Potential effects on the local and wider economy as a result of significant residual significant environmental effects which have the potential for economic consequences	Local economy as influenced by resources and receptors as identified by other environmental topics including minerals (Land quality) and heritage assets (Historic environment).
Temporary construction workforce and supply chain	Potential temporary effect of employment generation and effects on businesses in the construction supply chain	Local economy and businesses
	Potential effects of new employment and business generated by the DCO Project on the labour market, skills and training (e.g. apprenticeships) in or related to the construction phase	People, local economy
	Potential temporary effect of employment generation and construction activity on the labour market and subsequently the housing market	Labour market, housing market, providers of regulatory/planning services
Operation		
Employment and business generation as a result of expansion	Potential wider effects on employment and the economy through direct influence (e.g. jobs and businesses supported directly related to the operation of the Airport), indirect influence (growth in business and jobs supported in the	People, local and wider economy



Activity	Effect	Receptor
	Airport’s supply chain) and induced influence (jobs and businesses supported as a result of expenditure on goods and services) of expansion	
	Potential effects of new employment and business generated by the DCO Project on skills and training (e.g. apprenticeships) in or related to the operational development	People, local economy
	Potential additional effects on employment and the economy through catalytic effects at the regional scale (as a result of improved connectivity resulting in additional trade, foreign direct investment and tourism)	Regional economy
	Potential for wider economic effects such as inward investment, local retention of business rates, spending and supply chain effects as a result of policy changes and changes to the local economy and business community as a direct result of the DCO Project	Business community, Local Planning Authorities
	Potential additional effects on the wider labour market and housing market as a result of operational employment generation	Labour market, housing market, providers of regulatory/planning services
Changes to resources as a result of other environmental assessments	Potential effects on the local and wider economy as a result of significant residual environmental effects which have the potential for economic consequences (including transport/traffic effects)	Business community

10.8 Effects not requiring assessment

10.8.1 This assessment will consider effects related to the DCO Project where:

1. There is a potential likely significant effect on local businesses, jobs, skills, training and education with a pathway to the DCO Project that would require mitigation; and /or
2. That effect has the potential to contribute to a significant effect when combined with other environmental effects on economic/employment receptors; and/or



3. The effect and its significance on economic/employment receptors, and its cause by the DCO Project, can be evidenced empirically; and/or
4. Assessment of the effect on economic/employment receptors is specifically required by the revised draft ANPS and is not already defined by the Appraisal of Sustainability as part of the revised draft ANPS.

10.8.2 Table 10.7 sets out the effects that are not intended to be covered by this assessment.

Table 10.7 Potential effects to be scoped out of the economics and employment assessment

Activity	Effect	Receptor	Justification for scoping out
Increased trade, FDI and Tourism to the UK as a result of improved connectivity and aviation capacity	National scale gross domestic product (GDP) benefits associated with this scale of expansion	National economy	The scale of national benefit generated has been assessed through the revised draft ANPS ³ and will therefore not be assessed in the EIA unless there is a spatial component below the national scale.
Effect on property value and availability	Effect on property value as a result of loss/displacement, environmental changes, or pressure on developable land and property	Local and wider housing and commercial property market	Property value is variable and dynamic, and it is not possible to isolate and empirically estimate the quantitative effect of this DCO Project alone on the wider property market given the temporal scope, the scale of other influences, and background changes. Notwithstanding this, the Applicant recognises that there will be effects on property, and compensation will be available to eligible parties under the Property Policies, which includes information on financial hardship.

10.9 Proposed approach to the assessment

- 10.9.1 This section sets out the proposed approach to assessment of the likely significant effects identified in Section 10.7: Likely significant effects requiring assessment.
- 10.9.2 Socio-economic effects are partly determined by the nature of a development; the nature of the locality; and policy decisions taken by key stakeholders (e.g. the developer’s policy on accommodation, local recruitment, training etc; and the policy positions and socio-economic objectives of local and regional authorities



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and agencies). These determinants need to be investigated thoroughly to clarify the likely set of key effects.

- 10.9.3 Methods for predicting and assessing effects will draw on existing policy, standards and guidance, analysis and methods established for other large infrastructure and development projects.
- 10.9.4 The detailed assessment methodology will be agreed with stakeholders during future engagement and response to scoping. The study areas are set out in Section 10.4: Study areas. These will be kept under review and as the design and consultation processes progress, the DCO Project is refined and related topic assessment study areas are confirmed, the study areas may evolve as appropriate.
- 10.9.5 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the economics and employment assessment and methodologies that will be used will not be affected.

Additional baseline information required

- 10.9.6 Should the study areas change in response to the evolving design, the need for any additional baseline data for the economics and employment assessment may be reviewed and updated.
- 10.9.7 Additional information relating to resources and receptors may be sought from a number of third-party organisations including members of the HSPG, other Local Planning Authorities, governmental and non-governmental organisations, and specific interest groups.
- 10.9.8 Any data collected to inform the assessment will be sense-checked with Local Planning Authorities and such other stakeholders as are relevant.

Assessment years

- 10.9.9 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the economics and employment assessment specifically.

Baseline

- 10.9.10 Some datasets, like the 2011 Census, provide detailed spatial information and represent a reliable sample size, but by the time of assessment will be dated. Where possible other National Statistics and public datasets will be used to update 2011 Census data, but in some cases this remains the most reliable and spatially detailed source.



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- 10.9.11 This assessment will also consider a future baseline (refer to Section 4.8: Engagement for description of future baseline) based on projections of economic and demographic change, in order to consider the effects of the DCO Project on local labour markets and the economy in the future compared to the characteristics of the labour market and economy today. Projections of economic and demographic change at assessment years across the study areas will be procured by the Applicant from reputable, industry-standard providers and the spatial scale, methodology and assumptions will be agreed with HSPG through regular engagement to ensure they are fit for purpose for this assessment, and consistent with future baseline assumptions for other assessments.

Assessment

- 10.9.12 Different effects will arise as a result of the characteristics of the construction phase and changes in the level of operation of the Airport (which may overlap with the construction phase).
- 10.9.13 During assessment years in the construction phase, economic effects will depend on the duration of the construction period, the phasing of construction activity related to displacement, and the peak of construction activity (i.e. highest number of workforce and supply chain). Phasing of construction activities will inform the displacement and potential replacement of business property and land where that has the potential to occur.
- 10.9.14 During assessment years related to changes in the operation of the Airport (which may occur during the construction phase), assessments will also be made with regard to changes in the number of passengers, ATMs and cargo throughput, (which drive direct employment) including the release of the first phase of capacity, the year of opening, year of maximum ATM capacity, and interim years.

Construction and operation assessment methodology

Proposed methodology

- 10.9.15 The methodology for assessing potential likely significant effects during the construction and operation phases (detailed in Table 10.6) will take the following steps:
1. Identification of **receptors potentially affected** by the DCO Project, including businesses, residents, communities, and labour markets and housing markets. The assessment of effects related to jobs, skills and the labour market will draw on information from:
 - a. Other environmental impact assessment topic assessments
 - b. Heathrow's Transport Assessment and resulting Surface Access Strategy



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- c. The physical parameters of the DCO Project
 - d. Construction phasing and workforce and supply chain requirements
 - e. Change related to the CPZ and WPOZ
 - f. Current and future baselines for population and employment.
2. Investigation of the **sensitivity of those receptors to change** by analysis of metadata – this will be influenced by desk study, stakeholder engagement, and public datasets
 3. Review of **policy, standards and guidance relevant to potential changes** that may occur to the receptors as a result of the DCO Project
 4. **Application of scenarios** to assess the range of likely significant effects that could occur, including loss/displacement or change to access and amenity of business or commercial activity, and development of mitigation strategies to avoid or reduce significant effects and enhancement strategies to maximise the beneficial effects. At different points in the DCO Project's construction and operational phases, there will be variation in the effects experienced. There is also uncertainty in terms of the response of sensitive receptors to change, and therefore the long-term residual effects that may be experienced. In order to address this, an 'adaptive' assessment approach will be adopted. This involves considering 'ranges' and 'alternative scenarios' in the assessment to identify a range of possible outcomes. This will inform any mitigation identified that will then be subject to a 'plan-monitor-management' approach. This means that the DCO Project should be subject to regular monitoring, with mitigation reviewed and amended as required as new information becomes available.

10.9.16 When these scenarios have been identified, the following will be undertaken:

1. Engagement with stakeholders to gain understanding of sensitivities and potential enhancement strategies (including through the HSPG, HCEB and statutory consultation)
2. Identification of opportunities at the local level, in the context of national standards and commitments for business development, employment and skills identified in emerging policy (including NPPF, revised draft ANPS and Local Enterprise Partnerships guidance)
3. Assessment of this in the context of current and future baselines for both population and employment, applying the significance criteria outlined in paragraphs 10.9.26-10.9.26.

10.9.17 The assessment will have regard to the potential inequity of effects and their significance to groups with protected characteristics as identified by the Equality



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Act 2010. A full assessment of effects on groups with protected characteristics will be in the EqIA.

Approach to assessment of significance of effects

- 10.9.18 There is no UK legislation or guidance that specifies the detailed content required for socio-economic assessments or provides appropriate standards and thresholds for the assessment of significance of effects.
- 10.9.19 Effects are broadly derived from the interaction between the **magnitude** of impacts and the **sensitivity** of the resources and receptors.
- 10.9.20 The main sensitive receptors for the economic and employment assessment are people, businesses and the local and regional economy and housing and labour markets within the study areas identified in Section 10.4. Receptors can be sensitive at any spatial scale and sensitivity differs between types of receptors depending on the spatial scale.
- 10.9.21 There will therefore be a focus on the **sensitivity** of each receptor and in particular on their ability to respond to change. The economic environment is dynamic and adaptive with constant background change and turnover, for example people moving into and out of an area and changing jobs, businesses forming, expanding, moving and closing. It is also reflective of a dynamic baseline at a national scale related to the economic cycle.
- 10.9.22 Sensitivity will be broadly assessed on the following basis:
1. High level of sensitivity – where a receptor has limited ability to respond to change (for example, where a business has limited capacity to respond to market change)
 2. Medium level of sensitivity – where a receptor has some ability to respond to change
 3. Low level of sensitivity – where a receptor is particularly responsive to change or able to cope with change without substantial effects on existing status or viability.
- 10.9.23 The baseline assessment will identify the sensitivity of each receptor (including the ability to respond to change) and then, where possible, the **magnitude** (scale) of likely impacts will be benchmarked against it using quantitative information where possible, or qualitative assessment based on professional judgement.
- 10.9.24 The magnitude of impacts will broadly be assessed on the following basis:
1. High magnitude – where the effect has the potential to result in substantial change to a receptor or resource (for example the labour market) at a given spatial scale



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2. Medium magnitude – where the effect has the potential to result in noticeable change to a receptor or resource at a given spatial scale
3. Low magnitude – where the effect has a hardly perceptible change to a receptor or resource at a given spatial scale
4. Negligible magnitude – where the effect has no discernible change (e.g. within the margin of error) at a given spatial scale.

10.9.25 The magnitude and sensitivity assessments will also take into account embedded mitigation. The **significance** of effects (positive or negative, and major, moderate, minor and negligible) will then be determined, taking into account the following factors:

1. The capacity of the relevant area, resource or receptor to absorb or respond to the impact, which may be influenced by the geographical extent of the receptor, and the context of the impact in terms of recent rates of change (i.e. the sensitivity, as set out in paragraphs 10.9.21-10.9.22)
2. The magnitude of the potential impact which may be influenced by the geographical extent of the impact, its permanence or temporary nature, the duration and reversibility of the impact (i.e. magnitude, as set out in paragraphs 10.9.23-10.9.24), and in the context of any embedded mitigation.

10.9.26 The **significance** of potential effects is determined through reference to the sensitivity of affected receptors, and the type and magnitude of change experienced by those receptors. A matrix based on that shown in Table 4.1 of **Chapter 4: Approach to EIA scoping** is used to guide the determination by combining the sensitivity and magnitude of change for each receptor. Professional judgement and engagement with HSPG, businesses, business groups and other national, regional and local public and quasi-public bodies (such as Chambers of Commerce and LEPS) will also influence the assessment.

Cumulative effects assessment

10.9.27 Cumulative economics and employment effects resulting from the combination of effects from the Scheme and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

10.10 Approach to mitigation of effects and enhancement of benefits

- 10.10.1 The EIA will identify mitigation measures that will help to avoid, reduce or, where appropriate, offset significant negative effects.
- 10.10.2 Mitigation opportunities will continue to be identified during design development prior to the DCO application submission. The EIA process is iterative, which is



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likely to enable further refinement of the DCO Project, with the objective of avoiding or reducing significant negative environmental effects. Mitigation measures will be identified by regularly reviewing the likely significant negative environmental effects identified during the ongoing assessment process and considering these at regular planned workshops within HSPG and other stakeholders.

- 10.10.3 Where practicable, design modifications will be considered to avoid or reduce significant negative effects, i.e. embedded measures. The development of design (both physical land requirements and operational procedures) has considered the factors that influence the local economy, and local businesses, such as the options for land required for expansion minimising displacement, and surface access design to maintain connectivity.
- 10.10.4 Heathrow has set out a number of measures through the Airports Commission process (including through Heathrow's submission to the Airports Commission – 'Taking Britain Further'¹⁸) to avoid and reduce the scale of negative effects and to enhance positive effects such as employment, skills and training, which have been backed by the Government via the revised draft ANPS and re-stated by the applicant through recent public consultation (Consultation 1).
- 10.10.5 These measures will help to compensate or mitigate negative effects, and enhance benefits where they arise. It will be important to develop appropriate implementation strategies in order to ensure that these mitigation and enhancement activities are effective.
- 10.10.6 The revised draft ANPS suggests some measures that are required to be implemented to enhance economic and employment benefits including ensuring 5,000 additional apprenticeships (para 5.263 of the ANPS), within the core airport, in the supply chain and in other airport-related businesses.
- 10.10.7 The revised draft ANPS also states that the Government will investigate how authorities can benefit from retention of locally collected business rates.
- 10.10.8 Heathrow will also seek to continue to implement and improve measures to secure local employment and business support such as the Skills Taskforce and Heathrow Academy.
- 10.10.9 The approach to mitigation of significant effects will draw upon engagement with people, Local Planning Authorities, businesses, skills and training bodies directly affected where possible, and where effects are uncertain or may arise over time, we will adopt an 'adaptive' approach to impact assessment and mitigation, outlined within this chapter.

¹⁸ Heathrow Airport Ltd, Taking Britain Further, 2014



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- 10.10.10 During construction, mitigation measures related to the management of the construction workforce will be outlined within the draft Code of Construction Practice.



Chapter 11

Historic environment



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11. HISTORIC ENVIRONMENT

11.1 Introduction

11.1.1 This chapter describes the scope of the assessment as it relates to the historic environment. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.

11.1.2 This chapter describes:

1. The historic environment policy and legislative context
2. Topic specific stakeholder engagement so far and future proposed engagement
3. The study area for the assessment
4. Sources of data used for scoping
5. Baseline conditions, including current desk studies and surveys
6. Likely significant effects of the DCO Project on historic environment
7. Effects not requiring assessment
8. The proposed approach to the assessment
9. Approach to mitigation.

11.2 Policy and legislation

11.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 11: Historic environment** and is intended to inform the assessment in the Environmental Statement (ES). Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is set out in Section 1.3: Policy, which should be read in conjunction with this chapter.

11.2.2 The policy relevant to the historic environment assessment methodology is detailed in Table 11.1.



Table 11.1 Policy and legislation relevant to the historic environment assessment

Relevant policy / legislation	Relevance to the assessment
<p>Revised draft Airports National Policy Statement (revised draft ANPS)¹</p>	<p>The revised draft ANPS includes a dedicated section on the Historic Environment (5.185-5.210).</p> <p>The revised draft ANPS (5.195-201) confirms that when determining applications for development consent, the Secretary of State must comply with legislation relating to listed buildings, conservation areas and scheduled monuments set out in the Infrastructure Planning (Decisions) Regulations 2010. To enable appropriate assessment to be made of the effect of the proposals on the historic environment, there is a need to properly understand the significance of each heritage asset that may be affected, its setting, surroundings and landscape context; to define how they are currently experienced, or might be better appreciated; to identify potential harm; and to develop appropriate design or mitigation responses (revised draft ANPS 5.191). It is expected that detailed studies will be required for those heritage assets likely to be affected by noise, light and indirect impacts based on guidance published by Historic England, and that where the development is likely to affect the setting of heritage assets, visual representations may be required to assist in assessing the impact (revised draft ANPS 5.192).</p> <p>The revised draft ANPS (5.200-201) incorporates the tests and decision-making criteria set out in Chapter 12 of the National Planning Policy Framework (NPPF) requiring the Secretary of State in considering the impact on heritage assets of development proposals, to give great weight to the asset’s conservation. Any loss or harm will require clear and convincing justification. Substantial harm or loss to grade II listed buildings or registered parks and gardens should be exceptional, and in relation to higher designation heritage assets (including grade I and II* listed buildings, and registered parks and gardens, World Heritage Sites, and Scheduled Monuments (SMs)) should be wholly exceptional. Such harmful impact should be weighed against the public benefit of the development, recognising that the greater the harm the greater justification will be required.</p> <p>Where the development will lead to substantial harm or total loss of a designated heritage asset, the revised draft ANPS (5.202) confirms that the Secretary of State will refuse consent unless it can be demonstrated that such harm or loss is necessary in order to deliver substantial public benefits that outweigh that harm or loss, or that certain key conditions apply.</p> <p>The revised draft ANPS (5.189) specifies that non-designated heritage assets of archaeological interest that are demonstrably equivalent to Scheduled Monuments should be considered subject to the policies for designated heritage assets. The absence of designation for such heritage assets does not indicate lower significance.</p>

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant policy / legislation	Relevance to the assessment
	<p>The revised draft ANPS (5.190) further specifies that the Secretary of State will also consider the impacts on other non-designated heritage assets on the basis of clear evidence that the assets have a significance that merits consideration in that decision, even though those assets are of lesser value than designated heritage assets. The non-designated heritage assets would be identified either through the development plan process by local authorities, including through 'local listing', or through the nationally significant infrastructure project examination and decision making process.</p> <p>The revised draft ANPS (5.207) makes clear that making documentary records of the past is not as valuable as retaining the heritage asset, and the ability to record heritage assets should not be a factor in deciding whether consent for the development should be granted.</p>
<p>National Networks National Policy Statement (NN NPS)²</p>	<p>The NN NPS includes a dedicated section on Historic Environment (5.120 to 5.142). The contents of this section in the NN NPS largely reflect the comments in the revised draft ANPS.</p> <p>Where the development is subject to EIA the applicant should undertake an assessment of any likely significant heritage impacts of the proposed project and describe the significance of any heritage assets affected, including any contribution made by their setting. Where a site includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation.</p> <p>The NN NPS incorporates the tests and decision-making criteria set out in Chapter 12 of the National Planning Policy Framework (NPPF) in the same manner as the revised draft ANPS.</p>
<p>National Planning Policy Framework (NPPF)³</p>	<p>Section 12 of the NPPF (Section 16 of the revised draft NPPF⁴) deals with 'Conserving and Enhancing the Historic Environment'. These sections are broadly the same and are incorporated into the revised draft ANPS and NN NPS.</p>
<p>Legislation</p>	
<p>Infrastructure Planning (Decisions) Regulations 2010</p>	<p>Regulation 3 sets out requirements for decision-makers to:</p> <ul style="list-style-type: none"> - have regard to the desirability of preserving SM's or their setting. - have regard to the desirability of preserving listed buildings, and any features which contribute to their special interest and their settings. - have regard to the desirability of preserving the character and appearance of conservation areas.

² Department for Transport, National Policy Statement for National Networks, 2014

³ Department for Communities & Local Government, National Planning Policy Framework, 2012

⁴ A revised draft NPPF is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard (Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018).



Relevant policy / legislation	Relevance to the assessment
<p>Ancient Monuments and Archaeological Areas Act (1979)</p>	<p>Sites assessed to be of national importance are required to be compiled in a Schedule of Monuments. These sites are accorded statutory protection and Scheduled Monument Consent is normally required before any works are carried out which would have the effect of demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or covering up a scheduled monument. Where development consent is granted there is no requirement to secure separate Scheduled Monument Consent.</p>
<p>Planning (Listed Buildings and Conservation Areas) Act (1990)</p>	<p>Covers the registration of listed buildings, being buildings, sites or structures that are seen to be of special architectural or historic interest. Listed buildings are classified as grade I, II* and II and are accorded statutory protection.</p> <p>Additionally covers the designation of Conservation Areas (areas of special architectural or historic interest) the character or appearance of which it is desirable to preserve or enhance.</p> <p>Where development consent is granted there is no requirement to secure separate listed building consent or consent for relevant demolition.</p>
<p>The Hedgerows Regulations 1997</p>	<p>Sets out criteria for identifying important hedgerows and for a process of gaining consent for their removal. A hedgerow is 'important' if it or the hedgerow of which it is a stretch has existed for 30 years or more and satisfies at least one of the criteria listed in Part II of Schedule 1. These criteria include a number of heritage-based considerations including that the hedgerow marks the boundary, or part of the boundary, of at least one historic parish or township (defined for this purpose as existing before 1850); the hedgerow incorporates an archaeological feature which is an SM; the hedgerow is situated wholly or partly within an archaeological site which is an SM or is associated with any monument or feature on that site; the hedgerow marks the boundary of a pre-1600 AD estate or manor or is visibly related to any building or other feature of such an estate or manor; or the hedgerow is recorded as an integral part of a field system pre-dating the Inclosure Acts or is part of or visibly related to any building or feature associated with such a system and that system is substantially complete or is of a pattern which is recorded as a key landscape characteristic by a local planning authority (Schedule 1, Part II). Removal of an important hedgerow is deemed as permitted where a planning permission or Development Consent Order (DCO) which would require removal of a hedgerow has been granted as detailed in <i>The Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations 2015</i></p>

11.2.4 Due regard will also be given to local policies and the Government's 25 year environment plan⁵ where they are relevant.

⁵ HM Government. Our Greener Future: Our 25 Year Plan to Improve the Environment, 2018



11.3 Stakeholder engagement

11.3.1 In preparing this Scoping Report, meetings have been held with a number of consultees to discuss the scope and approach for obtaining baseline information on the historic environment and to agree the approach to identifying any likely significant environmental effects on the historic environment arising from the DCO Project. These discussions have also informed the approach to the assessment of the significance of relevant heritage assets and associated impact of any likely environmental effects of the DCO Project. They also assisted in identifying further scope for the baseline studies described in this report. This dialogue will continue throughout the preapplication period as part of the EIA process. A summary of the consultations so far undertaken is presented in Table 11.2.

Table 11.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
<p>Historic England</p>	<p>Meetings with technical staff agreed the following:</p> <ol style="list-style-type: none"> 1. Nature of baseline data available and proposed to be collected 2. Proposed characterisation strategy 3. Rationale for core study area 4. Extent of the core study area and that future changes to study area will continue to be reviewed and agreed as the DCO Project evolves. <p>Meetings discussed:</p> <ul style="list-style-type: none"> • Provision of initial baseline data and reports on historic landscape characterisation in the study area • Green Infrastructure design principles. <p>The approach to characterising places for the purposes of the historic environment assessment was agreed. This is set out in Appendix 11.1: Historic Environment Assessment Characterising Places.</p>	<p>Meetings with technical and wider staff to discuss:</p> <ol style="list-style-type: none"> 1. Emerging characterisation results 2. Historic environment assets 3. Likely significant effects 4. Emerging mitigation and remediation strategy and overarching written scheme of investigation 5. Draft Code of Construction Practice (CoCP) requirements. <p>Provision of additional baseline data and reports on historic environment in the core and wider study areas.</p>



Consultee	Engagement undertaken to date	Proposed future engagement
Heathrow Strategic Planning Group (HSPG)	Meeting with technical staff covered the proposed approach to characterising places for the purposes of the historic environment assessment. Discussion and comments provided on the draft copy of Appendix 11.1 .	
Greater London Archaeological Advisory Service	Meeting with technical staff covered proposed approach to characterising places for the purposes of the historic environment assessment. Discussion and comments provided on draft copy of Appendix 11.2 .	
Highways England	-	Discussion with technical staff to ensure proposed assessment methodologies are in line with DMRB ⁶ requirements.

11.4 Study areas

11.4.1 This section sets out the proposed study areas for the historic environment assessment. As the design and consultation processes progress and the DCO Project is refined, the study areas may continue to evolve to accommodate any changes that are generated. As the study areas change, data collection may also be reviewed and updated.

Core study area

11.4.2 The core historic environment study area is based on the proposed development area of the DCO Project and all surrounding areas contained within a one kilometre radius of the proposed development area (Figure 11.1).

11.4.3 The core historic environment study area will be used to develop an understanding of the historic environment relating to the development footprint of the DCO

⁶ Highways Agency, Design Manual for Roads and Bridges: Volume 11 Environmental Impact Assessment, Highways, 2009



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Project. This extensive study area allows for a holistic approach to the characterisation and assessment of the historic landscape and informs the identification of designated and non-designated historic environment assets, especially their settings, across the wider area.

Wider study area

- 11.4.4 An additional wider historic environment study area will be defined to identify heritage assets which lie beyond the core study area but which may be impacted by operational effects relating to noise and setting, which could cover a much larger area.
- 11.4.5 This wider study area will be identified through application of the Historic England Aviation Noise Metric and GPA3, and with reference to a calculated Zone of Theoretical Visibility (ZTV) of the proposed infrastructure and development components of the DCO Project (**Chapter 13: Landscape and visual amenity**). This wider study area will differ from the study area described in **Chapter 16: Noise and vibration** as it relies on the historic environment specific guidance on noise metrics. Spatial noise data conforming with noise metrics described in the Historic England Aviation Noise Metric⁷ will be plotted to identify heritage assets likely to experience noise effects, as agreed with Historic England and local planning authorities and described in Section 11.9: Proposed approach to the assessment. The spatial noise data required to produce the appropriate noise metrics will be provided as a result of the ongoing noise assessment.

11.5 Sources of data used in scoping

Baseline data collection

- 11.5.1 Baseline data collection is ongoing to obtain information that encompasses the whole of the core study area described in Section 11.4: Study areas. The baseline conditions presented in Section 11.6: Baseline conditions represent a review of the currently available data from the core study area collected to date. This has focused on designated heritage assets within the central region of the core study area, but will continue to ensure data is collected for the entirety of the core study area. Baseline data collection will also be extended to include non-designated heritage assets.
- 11.5.2 Designated heritage assets identified from the initial baseline data collection within the core study area are presented in Section 11.6, spatially mapped on Figures 11.1 to 11.18 and detailed in **Appendix 11.2: Designated historic environment assets within the study area (scheduled monuments, listed buildings and**

⁷ Temple Group, Aviation Noise Metric - Research on the Potential Noise Impacts on the Historic Environment by Proposals for Airport Expansion in England, 2014



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conservation areas). The areas within the core study area covered by the initial baseline data collection are indicated on Figures 11.1 – 11.18.

Desk study

11.5.3 The sources of data used in the preparation of this Scoping Report are summarised in Table 11.3.

Table 11.3 Historic environment data sources

Source	Data
British Geological Survey (BGS)	On-line Geoindex Borehole Record Viewer
Heathrow Airport Limited	Historic site investigation reports for Heathrow and surrounding developments Historic aerial photography Aerial drone photography
Historic England, National Heritage List for England (NHLE)	Designated Heritage Assets Historic Environment shapefiles (Scheduled Monuments (SM), listed buildings, protected wreck sites, registered parks and gardens, Registered Battlefields, World Heritage Sites, Buildings with Building Preservation Notices, Buildings with a Certificate of Immunity)
Landmark Information Group	County Series 1:10,560 and 1:2,500 Historical mapping National Grid series 1:1,250 and 1:2,500 Historical mapping National Grid series 1:10,000 and 1:10,500 Historical mapping Historic and current aerial photography and mapping
MAGIC website http://www.magic.gov.uk/MagicMap.aspx	Designated sites
UK Data Archive	1851 Historic Parish Boundaries
Local planning authority published conservation area appraisals, maps and enhancement plans: Ealing Borough Council https://www.ealing.gov.uk/info/201158/conservation_areas	Conservation Area Boundaries



Source	Data
<p>London Borough of Hillingdon https://www.hillingdon.gov.uk/article/22670/Conservation-areas-in-Hillingdon</p>	
<p>London Borough of Hounslow https://www.hounslow.gov.uk/downloads/download/118/conservation_area_appraisals_and_maps</p>	
<p>Royal Borough of Windsor and Maidenhead https://www3.rbwm.gov.uk/info/200207/conservation/666/conservation_areas/1</p>	
<p>Runnymede Borough Council https://www.runnymede.gov.uk/article/15530/Conservation-Areas-and-Listed-Buildings-policy-documents-and-guidance-</p>	
<p>Slough Borough Council http://www.slough.gov.uk/council/strategies-plans-and-policies/conservation-areas-and-listed-buildings.aspx</p>	
<p>South Bucks Borough Council http://www.southbucks.gov.uk/conservationareas</p>	
<p>Spelthorne Borough Council https://www.spelthorne.gov.uk/article/602/Trees-Conservation-Areas-and-Listed-Buildings</p>	

Baseline surveys

- 11.5.4 Initial informal baseline surveys undertaken to date are a result of a high level walkover survey at locations of historic environment assets, within historic villages and conservation areas as listed in Table 11.4.
- 11.5.5 Initial informal review of the interior of historic buildings at Harmondsworth Church (grade II* listed building) and Harmondsworth Great Barn (grade I listed building) has also been conducted over a number of visits.
- 11.5.6 Archaeological monitoring of the on-going ground investigation works and review of borehole logs is currently underway.



Table 11.4 Historic environment baseline surveys

Survey	Activity locations
High level initial site walkover survey	Locations including accessible designated heritage assets in and around: Longford, Harmondsworth, Sipson, Harlington, Cranford, Mayfield Farm, Stanwell, Stanwell Moor, Poyle, Horton and Colnbrook.
Informal review of historic building interiors	Harmondsworth Church Harmondsworth Great Barn
Archaeological review and monitoring	On-going Ground Investigation borehole locations

11.6 Baseline conditions

- 11.6.1 The results of the baseline data collected to date are provided in **Appendix 11.2**.
- 11.6.2 The baseline data collection is ongoing and information presented in this section represents a high level review of the available data sources, with an initial focus on designated heritage assets. The available baseline data, while not yet completed, provides a useful source of information that:
1. Is sufficient to define initial key issues regarding the effect of proposals for the DCO Project on the historic environment
 2. Informs a structured programme of further baseline data collection required to present a robust historic environment baseline.
- 11.6.3 As baseline data collection continues, the information will be used to determine the relative significance of heritage assets for the purposes of assessing the likely significant effects of the DCO Project.

Topography and geology

- 11.6.4 Heathrow lies in the Thames Valley National Character Area and is a component of the Greater London metropolitan south-west fringe: a diverse landscape of urban and suburban settlements, infrastructure networks, fragmented agricultural land, historic parks, commons, woodland, reservoirs and extensive minerals workings.
- 11.6.5 The core study area includes major rivers, historic artificial channels and many smaller ponds and streams. The Airport is located within the catchments of the River Colne on the western side of the Airport and the River Crane on the eastern side of the Airport. Associated watercourses and artificial channels flow to the



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west and south of the Airport including the Colne Brook, the Wraysbury River, the Longford River and the Duke of Northumberland's River.

- 11.6.6 Further detail on landscape conditions can be found in **Chapter 13: Landscape and visual amenity**.
- 11.6.7 Extensive parts of the core study area are underlain by Made Ground of varying thickness and composition as a result of historic quarrying and landfill activities.
- 11.6.8 Superficial deposits vary across the core study area but mainly comprise Alluvium, Langley Silt Member and River Terrace Deposits. All of these superficial geological formations have potential for survival of archaeological deposits.
- 11.6.9 The underlying solid geological deposits comprise London Clay overlying at depth the Lambeth Group beds and Chalk Group.
- 11.6.10 Further detail on ground conditions can be found in **Chapter 14: Land quality**.

Chronological overview

- 11.6.11 Whilst artefacts of earlier Palaeolithic date have been recorded in the surrounding terrace gravels, the earliest human presence in the landscape surrounding Heathrow can be assumed from at least the Upper Palaeolithic period. Hunting camps have been recorded elsewhere in the adjoining Colne Valley (e.g. Three Ways Wharf, Uxbridge) and Mesolithic hunter gatherer activity has been recorded through archaeological investigations at the Airport and the wider vicinity.
- 11.6.12 Traditions of communal or ceremonial activities at special locations, perhaps originating during the Mesolithic period, are represented in the landscape surrounding Heathrow through early Neolithic monument building such as Stanwell Cursus archaeological priority area and Mayfield Farm Causewayed Enclosure SM. Alongside ceremonial monuments, evidence of a number of notable structures, presumably domestic, have been found in the vicinity, such as recent archaeological discoveries made in advance of gravel extraction activities at Kingsmeade Quarry, Horton and Riding Court Farm, Datchet. These include evidence of four early Neolithic houses and a Neolithic Causewayed Enclosure, similar to the Mayfield Farm SM
- 11.6.13 Physical division of the landscape first occurs in the early Bronze Age with the creation of defined field systems and trackways.
- 11.6.14 Broad continuity of agricultural settlement from middle Bronze Age to the end of the Roman-British period is evidenced in the landscape surrounding Heathrow such as at Mayfield Farm Romano-British site (SM). This continuity of established landscape divisions may have influenced later estate and administrative structures.



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- 11.6.15 Permanent settlement and individual land ownership is associated with emergence of mid and late Saxon multiple estates located around Hounslow Heath and the eastern Colne Valley.
- 11.6.16 Broad continuity over time in progressive consolidation of settlement sites resulted in the historic villages which surround Heathrow today such as Harmondsworth and Stanwell. The overall rural and village character of the study area is apparent on the earliest historic mapping and reflected in the early historic parish divisions dating from the 12th and 13th centuries.
- 11.6.17 The introduction of major metropolitan infrastructure and suburbanisation radically transforms the rural landscape character in the 19th and early 20th centuries, culminating in the development of Heathrow itself in the 1940s on the site of the earlier Fairey Aerodrome.
- 11.6.18 In addition to the effect of the airport development, local urban form has also been greatly shaped by 19th and 20th century metropolitan infrastructure. This includes large scale water supply reservoirs, ongoing mineral extraction, former quarry landfill sites and a national motorway network.
- 11.6.19 A range of surviving residential village and estate forms, which have adapted or responded to the airport's presence, contain a varied historic building stock. These range from the medieval timber framed Harmondsworth Great Barn to the 1950's British Airways Staff Housing Society accommodation designed by Quantic Associates at Stanwell.

Designated heritage assets

- 11.6.20 The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora. Those elements of the historic environment that hold value to this and future generations because of their historic, archaeological, architectural or artistic interest are called 'heritage assets'. Heritage assets may be buildings, monuments, sites, places, areas or landscapes, or any combination of these. The sum of the heritage interests that a heritage asset holds is referred to as its significance. Significance derives not only from a heritage asset's physical presence, but also from its setting (revised draft ANPS 5.186-5.187). Heritage assets can be both designated heritage assets, as defined below, and assets identified by the Local Planning Authority including local listing⁸.

⁸ Department for Communities and Local Government, National Planning Policy Framework, 2012



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- 11.6.21 A designated heritage asset is defined as a World Heritage Site, Scheduled Monument, listed building, protected wreck site, registered park and garden, registered battlefield or Conservation Area (revised draft ANPS 5.188).
- 11.6.22 All designated heritage assets within the area of baseline data collected to date have been noted on Figures 11.2 to 11.18 and fully tabled in **Appendix 11.2**.
- 11.6.23 Scheduled Monuments are nationally important archaeological sites included within the National Heritage List for England (NHLE). There are seven SMs currently identified within the core study area where data has been collected to date.
- 11.6.24 Listed buildings which are historic buildings of special interest that are contained within the NHLE. Listed buildings can be listed at grade I, II* or II. There are 228 listed buildings currently identified within the core study area where data has been collected to date:
1. Four grade I listed buildings classed as being of exceptional interest
 2. Sixteen grade II* listed buildings classed as being of more than special interest
 3. Two hundred and eight grade II listed buildings classed as being of special interest.
- 11.6.25 Conservation Areas are areas identified and designated by Local Planning Authorities as having special architectural and historic interest. There are 11 Conservation Areas currently identified which lie partly or wholly within the core study area where data has been collected to date.
- 11.6.26 There are no protected wreck sites, registered parks and gardens, registered battlefields or World Heritage Sites within the core study area where data has been collected to date.

Non-designated heritage assets

- 11.6.27 Non-designated heritage assets are buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance meriting consideration in planning decisions but which are not formally designated heritage assets. These include locally listed buildings or sites, as well as unlisted buildings of merit within conservation areas and archaeological remains.
- 11.6.28 Baseline data on non-designated heritage assets will be incorporated as part of the detailed baseline studies and non-designated heritage assets will form part of the historic environment assessment, both as described in Section 11.9.



11.7 Likely significant effects requiring assessment

- 11.7.1 The following section sets out the topic specific effects for historic environment. Cumulative effects resulting from the combination of effects from the DCO Project and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.
- 11.7.2 Heritage assets, including both designated and non-designated heritage assets, may experience significant effects as a result of the DCO Project. Likely significant effects requiring assessment may be temporary or permanent, and may occur during construction and operation. The likely significant effects requiring assessment are presented in Table 11.5.

Table 11.5 Likely significant historic environment effects

Activity	Effect	Potential receptor
Construction		
Enabling Works - Physical works for clearing and preparing the development site for construction, as described in Section 3.4: Development programme and construction including the following key activities: <ol style="list-style-type: none"> 1. Construction of site establishment works including logistics facilities 2. Advance mitigation works and site clearance 3. Removal of existing structures 4. Commencement of diversion/realignment of existing rivers 5. Commencement of diversion of existing utilities 6. Provision of new, diversionary and replacement roads. 	Direct loss of significance of heritage assets as a result of material change to or complete loss of heritage assets. These effects may be permanent as a result of certain construction activities.	Heritage assets directly within or adjacent to the footprint of any of required physical works for clearing and preparing the development site for construction including the identified key construction activities.
	Change to the significance of heritage assets as a result of perceptual change to the setting of heritage assets. These indirect effects may be temporary for the duration of certain construction activities.	Heritage assets within the core study area (e.g. heritage assets located adjacent to the construction site of site establishment works including logistics facilities).



Activity	Effect	Potential receptor
<p>Airfield expansion – Physical works undertaken during construction of the new runway and taxiways as described in Chapter 3: The DCO Project, including:</p> <ol style="list-style-type: none"> 1. Earthworks activities required for the creation of the new formation level 2. Borrow pit excavation 3. Excavation activity to support construction of foundations, subsurface tunnels and associated airfield facilities. 	<p>Direct loss of significance of heritage assets as a result of material change to or complete loss of heritage assets. These effects may be permanent as a result of certain construction activities.</p>	<p>Heritage assets directly within or adjacent to the footprint of required earthworks and excavation activity associated with the physical works undertaken during construction (e.g. heritage assets located at the site of a borrow pit).</p>
	<p>Change to the significance of heritage assets as a result of perceptual change to the setting of heritage assets. These indirect effects may be temporary for the duration of certain construction activities.</p>	<p>Heritage assets within the core study area (e.g. heritage assets located adjacent to the site of borrow pit excavation).</p>
<p>Construction activity during enabling works, airfield expansion and campus development as described in Chapter 3: The DCO Project resulting in changes to:</p> <ol style="list-style-type: none"> 1. Traffic activity 2. Noise 3. Vibration 4. Dust 5. Visual amenity 6. Urban and landscape character. 	<p>Direct loss of significance of heritage assets as a result of material change to or complete loss of heritage assets. These effects may be permanent as a result of certain construction activities.</p>	<p>Heritage assets within the core study area (e.g. heritage assets within an area of increased vibration as a result of construction activities).</p>
	<p>Change to significance of heritage assets as a result of perceptual change to the setting of heritage assets. These indirect effects may be temporary for the duration of certain construction activities.</p>	<p>Heritage assets within the core study area (e.g. heritage assets within an area of changed visual amenity as a result of construction activities).</p>
Operation		
<p>Land use changes as a result of the DCO Project</p>	<p>Change to the significance of heritage assets as a result of material or perceptual change to heritage assets. These effects may be permanent as a result of the development.</p>	<p>Heritage assets within the core study area (e.g. heritage assets within an area of changed land use resulting in e.g. a change in heritage asset management).</p>



Activity	Effect	Potential receptor
	Change to the significance of heritage assets as a result of material or perceptual change to heritage assets. These effects may be permanent as a result of the development.	Heritage assets within the wider study area sensitive to changes in their setting (e.g. heritage assets within the wider study area experiencing a change in views as a result of the development).
Changes in the visibility and noise of Airport operations due to the DCO Project and airspace change	Change to the significance of heritage assets as a result of perceptual change to heritage assets. These effects would persist through the operation of the proposed development and would be treated as permanent.	Heritage assets within the core study area (e.g. heritage assets experiencing a change in setting due to change in visibility of airport operations).
	Change to the significance of heritage assets as a result of perceptual change to heritage assets. These effects would persist through the operation of the proposed development and while they could be intermittent would be treated as permanent.	Heritage assets within the wider study area sensitive to changes in their setting (e.g. heritage assets within the wider study area experiencing a change in views as a result of the development).

11.8 Effects not requiring assessment

11.8.1 Within the core study area, all effects arising from the construction and operation of the DCO Project as set out in Table 11.5 will be assessed. However within the wider study area it is considered that likely significant environmental effects will only arise as a result of perceptual change to the setting of heritage assets during operation (specifically in relation to changes in noise levels and vibration) and it is therefore proposed that in relation to heritage assets in the wider study area assessment is limited to operational effects and only in relation to heritage assets considered sensitive to changes in noise levels and vibration.

11.9 Proposed approach to the assessment

11.9.1 The study areas are set out in Section 11.4 will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed.



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- 11.9.2 The scope of the assessment and methodologies that will be used will not be affected by a decision to select any of the options as described for the components in **Chapter 3: The DCO Project**.
- 11.9.3 The historic environment assessment of effects follows the significance-based approach to historic environment decision-making set out in the revised draft ANPS and the NN NPS, which are entirely consistent with the NPPF and associated NPPF Planning Practice Guidance (PPG) Conserving and Enhancing the Historic Environment⁹, and by Historic England guidance document Managing Significance in Decision-Taking in the Historic Environment¹⁰.
- 11.9.4 The approach and associated methodologies have been developed to meet the requirements of the UK legislative framework for the assessment and management of historic environment assets in England and incorporate current best practice including statutory and non-statutory guidance and codes of good practice.
- 11.9.5 The assessment methodology outlined in the next section will be used to assess the significance of the likely effects of the DCO Project on the historic environment and determine where relevant the requirement for mitigation.

Additional baseline information required

- 11.9.6 As described in Section 11.5, the need for any additional baseline data for historic environment will be reviewed and updated in line with the confirmed study areas.

Information management

- 11.9.7 A geographic information system (GIS) data platform will facilitate structured integration of research-led baseline data compiled during all stages of information gathering. This will be developed alongside the core and wider study area baseline surveys described in the next section. Its design will facilitate the sharing of spatial historic environment information with design teams.

Baseline surveys (core study area)

- 11.9.8 In accordance with Historic England advice and guidance, the historic environment baseline surveys (incorporating existing HERs) will include:
1. Historic landscape characterisation (HLC)
 2. Historic area assessment (HAA)

⁹ Ministry of Housing, Communities & Local Government, Conserving and enhancing the historic environment <https://www.gov.uk/guidance/conserving-and-enhancing-the-historic-environment> (accessed 03 May 2018)

¹⁰ Historic England, Managing Significance in Decision-Taking in the Historic Environment, 2015



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3. Historic aerial photographic survey
 4. Archaeological archive review
 5. Archaeological field evaluation.
- 11.9.9 HLC, HAA and historic aerial photographic survey will be conducted according to the methodology agreed with Historic England and Local Planning Authorities, as fully detailed in **Appendix 11.1**.
- 11.9.10 The HLC and HAA surveys will inform a review of the Designated Heritage Assets List and Descriptions, to be undertaken in consultation with the Historic England. This is to ensure baseline data recognises all heritage assets that meet designation criteria and includes an accurate description of the significance of heritage assets that meet such criteria.
- 11.9.11 In addition, baseline data compiled for the assessment of airport and transport noise will be used to inform the assessment of the setting of heritage assets. Data will conform with the Historic England Aviation Noise Metric⁶ as agreed with Historic England and local planning authorities.
- 11.9.12 Visits will be carried out to potential receptors of effects by qualified and experienced historic environment specialists. Specialist input from other environmental disciplines will be drawn on as required. Relevant archaeological and historical archive depositories will also be visited.
- 11.9.13 A programme of archaeological field evaluation will be undertaken in accordance with the overarching written scheme of investigation to be produced in agreement with Historic England, the HSPG and the Greater London Archaeology Advisory Service (GLAAS). This may include non-intrusive geophysical survey and a programme of targeted trial trench evaluation. These arrangements will be subject to further agreement with those stakeholders following consultation of the archaeological archive review.
- 11.9.14 Design of any future archaeological field evaluation will be based on the extent of the design, which will define the spatial extent of intrusive groundworks. It will also be informed by the emerging baseline information, including the HLC and HAA characterisation surveys.

Baseline surveys (wider study area)

- 11.9.15 In accordance with Historic England advice and guidance, the historic environment baseline surveys (incorporating The National Heritage List for England) will include:
1. Desk based study to:



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- a. Identify the distribution and location of designated heritage assets¹¹ that could be exposed to sound or visual effects that may affect heritage significance, or how that significance is appreciated, as a result of changes (both negative and positive) to setting
 - b. Review existing and forecast spatial noise metric and viewshed data related to airport operation to determine degree to which individual heritage assets are likely to be affected by changes in noise arising from airport expansion (both negative and positive)
 - c. Determine the potential sensitivity of heritage asset.
2. Specific and detailed site based studies for potentially sensitive heritage assets. Studies will describe the setting and the characteristics that contribute to significance, to identify and determine:
 - a. Specific aspects of the noise environment important to setting:
 - b. How those aspects of setting contribute to heritage significance or an appreciation of significance.
 - c. For heritage assets within the core study area this qualitative aspect of the study will draw on the HAA baseline data, as detailed above. The description of setting of specific heritage assets located in the wider study area, but outside the core area, will be consistent with the agreed HAA characterisation methodology;
 - d. Quantitative baseline data assessment for each potentially sensitive heritage asset using published metric and threshold measures for potential noise impacts on the historic environment by airport expansion.

Assessment years

- 11.9.16 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the historic environment assessment specifically.
- 11.9.17 The historic environment assessment will be divided into a number of assessment years covering the construction phase (including the enabling and early works) and operational phase of the development.
- 11.9.18 The baseline for the historic environment assessment will be established using the desk study, historic landscape and historic area characterisation assessments and

¹¹ If specific intelligence is available on non-designated heritage assets that warrant consideration they can be included within the scope of the assessment without the need to modify or amend the methodology.



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Ground Investigation data. This information will be used to assess the likely significant historic environment effects pre-construction.

- 11.9.19 The assessment of likely significant historic environment effects during the construction phase will be undertaken for periods of time equating to the peak earthworks phase and peak above ground infrastructure construction phase.
- 11.9.20 Assessment of the likely significant historic environment effects will also be undertaken during the operation phase of the DCO Project taking into account the year of greatest aircraft noise as set out in **Chapter 16: Noise and vibration** which is described as year the airport is forecast to reach full capacity (as per the revised draft ANPS) and year when the airport's noise impact is forecast to be highest (if different from the assessment years above) as per the revised draft ANPS.

Construction and operation assessment methodology

- 11.9.21 The proposed assessment methodology will remain the same for both the construction and operational phases of the development.
- 11.9.22 To understand the significance of effects on historic environment the study areas will be characterised and assessed. Effects on heritage assets can be direct or indirect, temporary or permanent and related to construction or operational activities.
- 11.9.23 Direct effects on heritage assets are effects causing direct loss of significance as a result of material change or loss of heritage assets. For example, this can include:
1. Demolition or removal of heritage assets as a result of construction activities
 2. Material change to heritage assets as a result of dust, noise or vibration related to construction or operational activities.
- 11.9.24 Indirect effects on heritage assets are effects which result in change to the significance of heritage assets as a result of material or perceptual change as a result of the development. Indirect effects on heritage assets may include:
1. Changes in noise experienced by heritage assets related to construction or operational activities
 2. Changes to setting of heritage assets as a result of the development.
- 11.9.25 The methodology adopted for the assessment of effects arising from change in setting follows the approach set out by Historic England¹². Loss of heritage significance may occur as a result of intervisibility or direct views between the

¹² Historic England, The Setting of Heritage Assets: Historic Environment Good Practice Advice in Planning: 3, December 2017



asset and the DCO Project, operational lighting and noise. These effects are understood in terms of the relationship of the heritage asset with its current setting and may be positive through preserving or enhancing the heritage significance of the asset, value-neutral or negative depending on the nature of the change, the character of the setting and its contribution to the heritage significance of the asset.

Significance evaluation methodology

- 11.9.26 The assessment of significance of any effect on a heritage asset is largely a product of the heritage significance of an asset and magnitude of the effect arising from the DCO Project. This is qualified by professional judgement of the assessment of the nature of the effects on an asset (both direct and indirect) and understanding of the heritage significance of the asset, including the contribution of the setting to that significance.
- 11.9.27 The revised draft ANPS and the NN NPS both set out that elements of the historic environment hold value to this and future generations are a result of their historic, archaeological, architectural or artistic interest, and these provide the basis for considering the significance of each heritage asset (including the contribution of its setting). These interests have been defined in the NPPF as follows:
1. Archaeological interest: the potential of a place to yield evidence about the past
 2. Historic interest: how the past can be connected to the present through a place through association with or illustration of the past
 3. Architectural/artistic interest: how sensory and intellectual stimulation is drawn from a place either through design or fortuitous development over time.
- 11.9.28 For the purposes of assessing the significance of effects in EIA terms, heritage significance has also been assigned to one of four classes, with reference to the heritage interests described above and relying on professional judgement as informed by policy and guidance. The hierarchy given in Table 11.6 reflects the NPPF distinction between designated and non-designated heritage assets. The NPPF further distinguishes between designated assets of the highest heritage significance (i.e. scheduled monuments, protected wreck sites, battlefields, grade I and II* listed buildings, grade I and II* registered parks and gardens, and World Heritage Sites) and other designated heritage assets. This further distinction is relevant to planning policy, but has less influence on the establishment of the significance of an effect in EIA terms.



Table 11.6 Definition of heritage significance

Heritage significance	Summary rationale	Example asset class
High	Asset has significance for an outstanding level of archaeological, architectural, historic and/or artistic interest	Designated heritage assets
Medium	Asset has significance for a high level of archaeological, architectural, historic and/or artistic interest	Locally listed buildings and buildings of merit. Regionally significant non-designated archaeological sites.
Low	Asset has significance for elements of archaeological architectural, historic or artistic interest	Locally-significant archaeological site
Negligible	Due to its nature of form/condition/survival, cannot be considered as an asset in its own right	Non-extant Historic Environment Record (HER) record

Magnitude of change

11.9.29 The magnitude of change of an effect is based on a number of factors:

1. The permanence of the effect (temporary or permanent)
2. Physical changes caused by the effect (both positive and negative)
3. The extent of the heritage asset that would be affected (e.g. the whole or a very small part)
4. The nature of the heritage asset that would be affected
5. The overall effect of changes on the values and significance of the heritage asset (including its setting).

11.9.30 In this context, the effects of change in the setting of a heritage asset may depend on individual aspects of that setting, and assessments must be, by their nature, specific to the individual assets being considered. Recent Historic England guidance ¹² advises that the following aspects of setting should be considered in addition to any identified key attributes:

1. The physical surroundings of the asset, including its relationship with other assets
2. The way the asset is appreciated
3. The asset's associations and patterns of use.



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- 11.9.31 It should also be noted that not all change necessarily detracts from the heritage significance of the asset. In the assessment of effects on the setting of heritage assets, the nature of the effect, i.e. positive, negative or neutral, of development is a subjective matter, usually taken to constitute a negative effect where change will constitute new and different elements to the setting of designated features, either to an imagined ‘contemporary’ setting or to their existing setting.
- 11.9.32 Effects on receptors are assigned to one of four classes of magnitude, defined in Table 11.7. Effects can be negative or positive and it is recognised that the revised draft ANPS looks to Heathrow to make, where possible, a positive contribution to the historic environment as part of its design response.

Table 11.7 Methodology criteria for magnitude of change

Magnitude of change	Summary rationale (negative)	Summary rationale (positive)
High	Loss of significance of an order of magnitude that would result from total or substantial demolition/disturbance of a heritage asset or from the disassociation of an asset from its setting.	Sympathetic restoration of an at-risk or otherwise degraded heritage asset and/or its setting and bringing into sustainable use with robust long-term management secured.
Medium	Loss of significance arising from partial disturbance or inappropriate alteration of asset which will adversely affect its importance. Change to the key characteristics of an asset’s setting, which gives rise to harm to the significance of the asset but which still allows its archaeological, architectural or historic interest to be appreciated.	Appropriate stabilisation and/or enhancement of a heritage asset and/or its setting that better reveal the significance of the asset or contribute to a long-term sustainable use or management regime.
Low	Minor loss to or alteration of an asset which leave its current significance largely intact. Minor and short term changes to setting which do not affect the key characteristics and in which the historical context remains substantially intact.	Minor enhancements to a heritage asset and/or its setting that that better reveal its significance or contribute to sustainable use and management.
Negligible	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and short term or reversible change to setting which does not affect the significance of the asset.	Minor alteration of an asset which does not affect its significance in any discernible way. Minor and short term or reversible change to setting which does not affect the significance of the asset.



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Determination of significance

- 11.9.33 The matrix in Table 11.8 has been prepared to guide the assessment of whether effects on the historic environment for the purposes of EIA are to be considered significant or not. For this assessment, a magnitude of change judged to be Medium or High would be considered to be significant or potentially significant in EIA terms. Additionally, a Low magnitude of change may be potentially significant which would be determined depending on the heritage significance of the asset and the exercise of professional judgement.

Table 11.8 Determination of significant effects for historic environment

Receptor heritage significance	Magnitude of change			
	High	Medium	Low	Negligible
High	Significant	Significant	Potentially Significant	Not Significant
Medium	Significant	Potentially Significant	Not Significant	Not Significant
Low	Potentially Significant	Not Significant	Not Significant	Not Significant
Negligible	Not Significant	Not Significant	Not Significant	Not Significant

11.10 Approach to mitigation

- 11.10.1 The approach to mitigation for the historic environment will comprise two principal elements.
1. Appropriate historic environment mitigation will be embedded within the design of the DCO Project. Where possible, scheme design, construction and operational practices will be used to avoid or reduce impacts on known historic environment assets. These measures will be taken into account as part of the assessment of effects of the DCO Project against baseline conditions
 2. Where such in-built design changes have not fully addressed likely environmental effects on the historic environment, a mitigation strategy will be developed. The approach to historic environment mitigation, where required, will be developed in consultation with Historic England and relevant stakeholders and follow appropriate guidelines and current best practice and in reference to mitigation proposed for other environmental topics.
- 11.10.2 Additional mitigation measures will be identified on a case by case basis depending on the significance of the heritage asset and the likely environmental effect and may include:



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1. Archaeological investigation, recording and dissemination designed to mitigate loss of archaeological interest through providing a permanent record of at-risk heritage assets
2. Landscape design to mitigate loss of architectural or historic interest arising from visible or audible change to setting
3. Noise attenuation measures intended to reduce construction and operational noise either at source or at the receptor to mitigate loss of architectural or historic interest arising from audible change to setting
4. Translocation of heritage assets to retain elements of architectural and historic interest.
5. Provision of enhanced access and interpretation to heritage assets to mitigate potential loss of historic interest
6. Localised enhancement measures within areas of historical and architectural interest to mitigate against visible change in setting causing loss of historical and architectural interest
7. Repairs and consolidation of historic fabric to mitigate loss of architectural and historic interest.



Chapter 12

Health



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12. HEALTH

12.1 Introduction

- 12.1.1 This chapter describes the scope of the assessment as it relates to human health, considering both the positive and negative effects. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 12.1.2 This chapter describes:
1. The health policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. The study areas for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the DCO Project on health
 7. Effects not requiring assessment
 8. The proposed approach to the assessment
 9. Approach to mitigation.
- 12.1.3 The requirement to consider health within the Environmental Impact Assessment (EIA) process was made explicit in The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (the ‘EIA Regulations’). There is no statutory guidance on considering health within the context of EIA.
- 12.1.4 The revised draft Airports National Policy Statement (the revised draft ANPS) also requires health impacts of the DCO Project to be assessed as set out in Section 12.2: Policy and legislation.
- 12.1.5 To address these requirements, a health impact assessment (HIA) will be prepared. HIA is a combination of tools and methods that helps to judge the potential health effects of a policy, plan, programme or project on the health of the population and the distribution of those effects within the population.
- 12.1.6 On this project there is a statutory requirement for EIA (including consideration of health), there is also a policy requirement for HIA. The DCO Project will seek to adopt a consistent approach between the EIA and HIA processes to meet both the statutory and policy requirements whilst avoiding unnecessary duplication. To



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achieve this, the tools and methods of HIA will be employed to identify, assess and manage any health impacts. Drawing on the analysis in the HIA, the Environmental Statement (ES) will report likely significant health effects and the measures taken by the DCO Project to enhance positive health effects and reduce negative health effects. The HIA will be reported as an appendix to the Health chapter of the ES. The scoping of potential health effects is the same for the EIA and the HIA and the same methods will be used.

- 12.1.7 This chapter uses the World Health Organisation’s (WHO) definition of health¹, which states that health is:

“a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity”.

- 12.1.8 Wellbeing is implicit in any reference to health. The terms ‘health’ and ‘health and wellbeing’ are used interchangeably. This chapter also uses a WHO definition for wellbeing which is an integral aspect of mental health. The WHO state that mental health is more than the absence of mental disorders and that mental health is a state of wellbeing defined as²:

a state in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”.

- 12.1.9 Graphic 12.1 shows how the factors that influence health and wellbeing apply at the individual level, e.g. smoking, use of alcohol and diet. It also shows how these factors apply at the level of local community (e.g. the level of support that people enjoy in their local community), and at the wider society level (e.g. whether employment is available and whether steps are taken to protect the environment). These influences are known as the ‘determinants of health and wellbeing’. These determinants can improve and protect health and wellbeing or they can be harmful. The effects might be on physical health and/or on mental health. Health and wellbeing are thus determined by a wide range of issues, many outside the control of individual choices. The assessment of human health will examine the ways in which the DCO Project potentially affects these determinants of health and wellbeing.

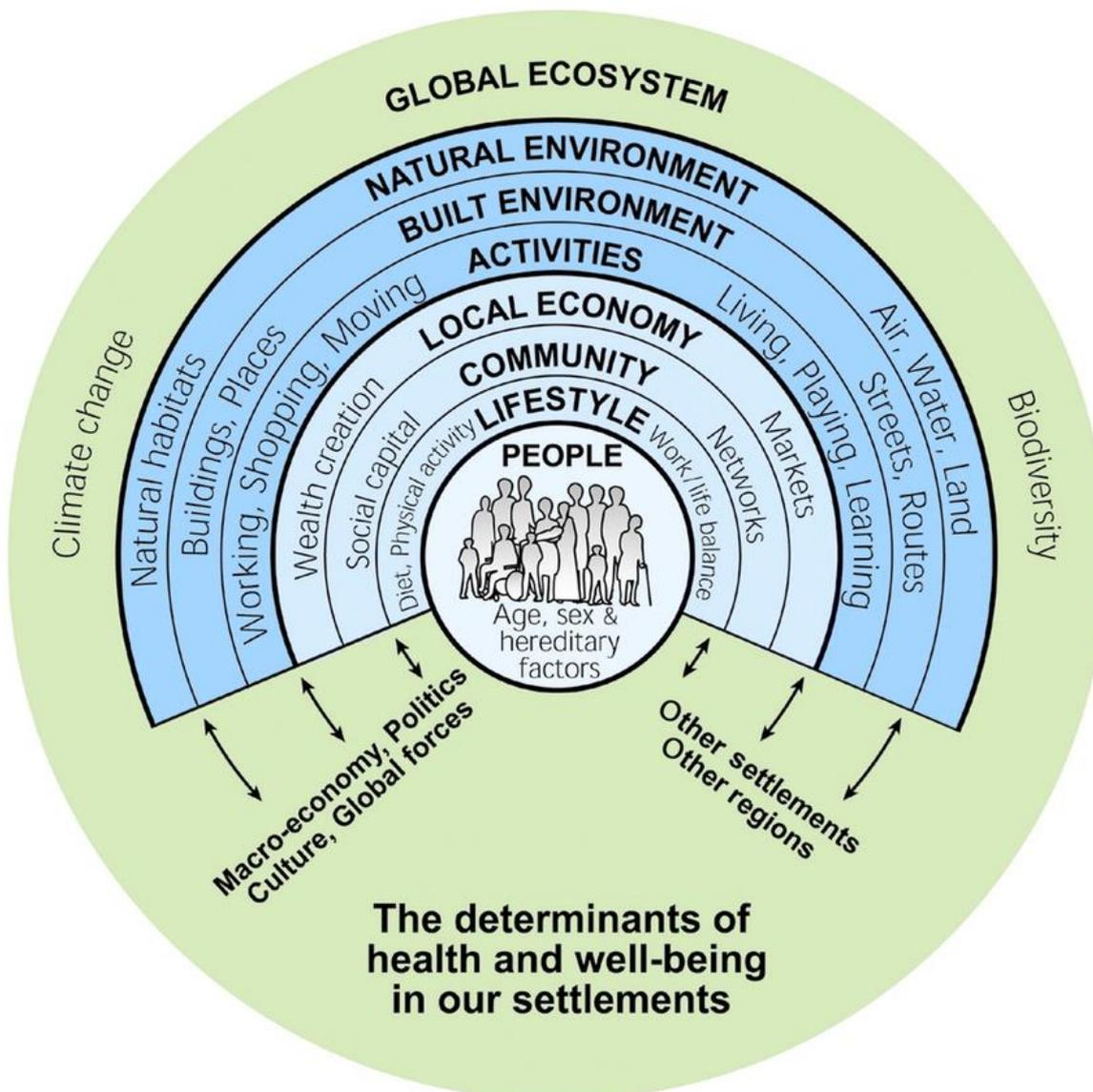
¹ World Health Organization, Preamble to the Constitution of the World Health Organization; signed on 22 July 1946 by the representatives of 61 States and entered into force on 7 April 1948. New York, 1946.

² World Health Organization, Mental health: strengthening mental health promotion. Fact sheet No.220, 2007



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Graphic 12.1 Determinants of health and wellbeing



From Barton and Grant (2006) ³

12.1.10 The chapter will have regard to health inequalities. The effects of the DCO Project may be experienced differently by different population groups; population groups can be identified by factors including (but not limited to) age, gender, ethnicity, socio-economic status, place of residence or pre-existing health status. Public health initiatives seek to reduce inequalities in health between population groups⁴.

³ Barton H, Grant M. A health map for the local human habitat. The Journal of the Royal Society for the Promotion of Health 126(6): 252-3, 2006

⁴ Department of Health. Improving outcomes and supporting transparency Part 2: Summary technical specifications of public health indicators. 2016. www.gov.uk/government/publications/public-health-outcomes-framework-2016-to-2019.



12.1.11 A project-level Equality Impact Assessment (EqIA) is also being prepared to accompany the DCO application. The EqIA will focus on assessing impacts on the groups with protected characteristics defined in the Equality Act 2010. The consideration of health inequalities is broader than the statutory protected characteristics set out in the Equality Act 2010; some of the vulnerable groups are shared in the assessments, but the health assessment will consider impacts on additional population groups (and may not consider all groups with protected characteristics). The EqIA also considers issues that extend beyond health and wellbeing. The assessments share inputs such as demography, evidence-based relationships and inputs from stakeholder engagement. The assessments are complementary and it is expected that a proportion of the methods, assessment conclusions and mitigations will be common to both the Health chapter of the ES and the EqIA Report.

12.2 Policy and legislation

12.2.1 This section identifies the relevant topic specific policies that have informed the scope of the assessment presented in **Chapter 12: Health**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter. Provisions to protect human health are subject of many separate statutory regimes covering issues such as environmental protection and occupational health and safety. The application of the EIA Regulations does not seek to duplicate the provisions of this legislation.

Table 12.1 Policy relevant to the health assessment

Policy	Relevance to assessment
<p>Revised draft ANPS (October 2017)⁵</p>	<p>The policy sets out the following requirements which are relevant to the assessment of health impacts:</p> <ol style="list-style-type: none"> 1. Paragraph 1.34: <i>“The Airports NPS has been subject to a Health Impact Assessment, which was published alongside the Airports NPS.”</i> 2. Paragraph: 1.35 <i>“The Health Impact Assessment identified impacts which would affect the population’s health, including noise, air quality and socio-economic impacts. In order to be compliant with the Airports NPS, a further project level Health Impact Assessment is required. The application should include and propose health mitigation, which seeks to maximise the health benefits of the scheme and mitigate any negative health impacts.”</i>

⁵ Department for Transport, Revised Draft Airports National Policy Statement: New Runway Capacity and Infrastructure at Airports in the South East of England, 2017



Policy	Relevance to assessment
	<p>3. Paragraph 4.66: <i>“The construction and use of airports infrastructure has the potential to affect people’s health, wellbeing and quality of life. Infrastructure can have direct impacts on health because of traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust, odour, polluting water, hazardous waste and pests.”</i></p> <p>4. Paragraph 4.67: <i>“New or enhanced airports infrastructure may also have indirect health impacts, for example if they affect access to key public services, local transport, opportunities for cycling and walking, or the use of open space for recreation and physical activity. It should also be noted, however, that the increased employment stemming from airport expansion may have indirect positive health impacts.”</i></p> <p>5. Paragraph 4.68: <i>“As described elsewhere in the Airports NPS, where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and set out the assessment of any likely significant health impacts.”</i></p> <p>6. Paragraph 4.69: <i>“The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate. These impacts may affect people simultaneously, so the applicant, the Examining Authority and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health.”</i></p> <p>The revised draft ANPS also acknowledges that air quality (paragraph 5.22), noise (paragraph 5.43 and 5.67), night flights (paragraph 5.55), waste management (5.133 – 5.138) and discharges to water (paragraph 5.170) can also affect health.</p>
<p>National Policy Statement for National Networks (NN NPS)⁶</p>	<p>The nature of the DCO Project means that the National Policy Statement for National Networks could apply to parts of the scheme.</p> <p>The revised draft ANPS states at paragraph 4.8 that <i>“The Secretary of State will consider any relevant nationally significant road and rail elements of the applicant’s proposals in accordance with the National Networks NPS and with the Airports NPS. If there is conflict between the Airports NPS and other NPSs, the conflict should be resolved in favour of the NPS that has been most recently designated.”</i></p> <p>The policy outlines how decisions will be made relating to development consent orders for nationally significant rail and road infrastructure projects.</p> <p>1. Paragraph 4.81: <i>“...where the proposed project has likely significant environmental impacts that would have an effect on human beings, any environmental statement should identify and</i></p>

⁶ Department for Transport, National Policy Statement for National Networks, 2014



Policy	Relevance to assessment
	<p><i>set out the assessment of any likely significant adverse health impacts."</i></p> <p>2. Paragraph 4.82: <i>"The applicant should identify measures to avoid, reduce or compensate for adverse health impacts as appropriate."</i></p>
<p>National Planning Policy Framework (NPPF)⁷</p>	<p>This policy sets out Government's planning policies for England and how these are expected to be applied. There are references to health in relation to each of the types of planning development, however, the overall objectives of the planning system relating to health are:</p> <ol style="list-style-type: none"> 1. Paragraph 7: Sustainable development: Planning system provides a social role – supporting strong, vibrant and healthy communities, by providing the supply of housing required to meet the needs of present and future generations; and by creating a high quality built environment, with accessible local services that reflect the community's needs and support its health, social and cultural well-being. 2. Paragraph 17: Core planning principles: take account of and support local strategies to improve health, social and cultural wellbeing for all, and deliver sufficient community and cultural facilities and services to meet local needs. <p>A revised NPPF⁸ is currently being consulted upon. Any revisions as a result of the consultation will be taken into account in the assessment. The revised NPPF is likely to continue to support the social role of development as set out above.</p>

12.2.2 Due regard will also be given to local policies and the Government's 25 year environment plan⁹ where they are relevant.

12.3 Stakeholder engagement

12.3.1 Stakeholder engagement is an important input to the assessment of health. As well as the views of professionals with responsibility for aspects of public health, the views of local people are important in identifying concerns felt by the local population.

12.3.2 Stakeholder engagement undertaken to date (Table 12.2) has focused on Local Planning Authorities (which includes their health obligations overseen by Directors of Public Health) and has been progressed through a Health sub-group of the Heathrow Strategic Planning Group (HSPG). The membership of the HSPG is set

⁷ Department of Communities & Local Government, National Planning Policy Framework, 2012

⁸ Ministry of Housing, Communities & Local Government, National Planning Policy Framework, Draft Text for Consultation 2018

⁹ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018



out in Section 4.9: Engagement. The HSPG Health Group will continue to be the focus for engagement with Local Planning Authorities on health issues. In addition, a number of other stakeholders will be approached during the assessment. As the assessment process progresses, the views of a broader group of stakeholders will be sought.

- 12.3.3 This Scoping Report itself forms part of an engagement process, feedback on which will help to confirm or further define the scope assessed. The assessment and the statutory consultation stages ahead will also provide the opportunity for the general public to comment on the scope and preliminary assessment.
- 12.3.4 Engagement undertaken to date and proposed future engagement is set out in Table 12.2.

Table 12.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
HSPG	<p>An initial workshop was held with the HSPG Health Group in January 2018. The objectives of the group are:</p> <ol style="list-style-type: none"> 1. Provide a forum for health stakeholders to learn about the DCO Project 2. Review and comment on the scope and assessment methods 3. Share information including best practice, data and specific issues relevant to local communities 4. Discuss and comment on the outputs of the assessment where possible 5. Review and comment on the measures for maximising positive and minimising negative health effects from the DCO Project. <p>Topics covered at the January meeting included the approach to the health assessment, the subject scope, the study area, data and information to inform the assessment and the identification of stakeholders. This initial dialogue helped to develop of the scope of the assessment, predominantly through identifying the main areas for technical focus of the assessment.</p>	<p>Future meetings of the HSPG Health Group are planned (feedback on how previous HSPG comments have been taken into account will be provided at each meeting):</p> <p>June 2018 – Discuss the EIA Scoping Report and get feedback on the proposed scope of the assessment.</p> <p>Summer 2018 – Discuss assessment methodologies in more detail and seek feedback.</p> <p>Autumn/Winter 2018 – Share emerging findings from the health assessments and seek feedback.</p> <p>Winter 2018/19 – Share ideas for mitigation, management, monitoring and enhancement measures and seek feedback.</p>



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>Priority issues discussed were:</p> <ol style="list-style-type: none"> 1. Noise: from aircraft and surface access sources; extent of night ban and impacts of early morning noise; impacts on those living in quiet locations; impacts on those newly exposed to noise; frequency of overflights 2. Construction traffic: current issue due to multiple existing developments; congestion, safety, air quality; cumulative impacts on individual communities 3. Uncertainty: of what is planned, when it would happen and how long it would take; impacts on way of life and changing nature of settlements. 4. Air quality and vehicles accessing proposed car parks, generating traffic on approach roads 5. Construction workers into communities – impacts on local services 6. Impacts on natural / semi-natural habitats, e.g. Colne Valley. 7. Opportunities for health improvement 	
<p>Public Health England, NHS England, NHS South East, NHS London</p>	<p>-</p>	<p>Formal engagement will commence in May 2018, through the EIA Scoping Report consultation process. Ongoing engagement will flow from this and will include follow up meetings to discuss feedback from the consultation and other relevant issues as they arise.</p>
<p>Health and Wellbeing Boards, Clinical Commissioning Groups, NHS Trusts, Mental Health Trusts, Medical</p>	<p>Stakeholders were notified of the DCO Project and invited to respond to the project wide 10-week public consultation (January - March 2018)</p>	<p>Awareness raising of the assessment will commence with relevant health professionals within these organisations in Summer 2018. Ongoing</p>



Consultee	Engagement undertaken to date	Proposed future engagement
<p>Committees, Directors of Public Health (for local authorities not represented in the HSPG), Healthwatch</p>		<p>engagement will also commence in Summer 2018 to provide opportunities to work collaboratively with relevant bodies to identify local health priorities or data that could inform the assessment</p> <p>The organisations will be invited to comment on the draft health assessment (the Preliminary Environmental Impact Report) as part of Consultation 2 (2019).</p>
<p>Transport for London, Environment Agency, Greater London Authority, Highways England</p>	<p>Stakeholders were notified of the DCO Project and invited to respond to the project wide 10-week public consultation (January - March 2018). Relevant responses to the consultation will feed into this assessment.</p> <p>Inputs from initial engagement through other assessment topics that are determinants of health (e.g. noise, air quality, traffic and transport) have been reflected, where applicable.</p>	<p>Following review of comments provided on the EIA Scoping Report relevant to health, meetings will be initiated to discuss issues arising from comments.</p>
<p>Local residents and community groups</p>	<p>Listening events were carried out with 15 local communities during April-May 2018 to hear from local residents what they value and enjoy about their area, they also sought to understand potential opportunities for improvement. Relevant information from these events will inform the assessment.</p> <p>Local communities were invited to respond to the project wide 10-week public consultation (January – March 2018). Public exhibitions were held in 40 locations, which gave local people the opportunity to ask questions about the project. Relevant responses to the consultation will feed into this assessment.</p>	<p>Consultation 2 (2019) will provide another formal opportunity for local residents to comment on the draft findings of the assessment of health.</p>



Consultee	Engagement undertaken to date	Proposed future engagement
Owners and operators of specific facilities that are impacted by the Project.	Ongoing engagement with owners and operators of facilities directly affected by land requirements of the DCO Project is underway and will continue throughout the project.	Specific engagement on health issues will occur in Summer 2018 which will inform the EIA, including the health assessment.

12.3.5 The establishment of the Heathrow Community Engagement Board (HCEB) (refer to Section 4.9: Engagement) provides an additional opportunity for the needs of the local community to influence the design and operation of the Airport.

12.4 Study areas

12.4.1 This section sets out the proposed study areas for the health assessment.

12.4.2 The determinants of health¹⁰ are varied and the range of activities associated with the phases of the DCO Project will differ in their impact and therefore influence on health determinants. It is possible for each health impact to affect people living in different locations; people living in the same location may also experience the same health impact differently.

12.4.3 The determination of the study area is driven by the location of the population who may experience health effects due to the DCO Project.

12.4.4 The DCO Project activities that influence the geographic extent of likely health impacts, and therefore the proposed study area for health, are:

1. Land required for the permanent airport and surface access infrastructure (including airport related development and airport supporting facilities)
2. Land required temporarily for construction of the new airport infrastructure
3. Temporary and permanent changes to surface access infrastructure and the communities affected
4. Changes to the scale and distribution of traffic movements leading to changes in local air quality pollutants and road safety risks
5. Changes in sound and air quality exposure from aircraft and other on-airport sources

¹⁰ Determinants of health are defined as "... social, economic and environmental factors which determine the health status of individuals or populations".. From World Health Organization, Health Promotion Glossary, 1998.



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6. Generation of employment opportunities.

12.4.5 The study area for health will vary depending on which health determinant is being assessed. The main inputs to inform the study are:

1. **Chapter 9: Community.** The requirement for land and the impacts associated with construction are expected to be experienced by those living in the communities around the existing Airport and land being considered for the DCO Project. For example, relocation of residents and impacts on remaining communities (including social cohesion), impacts on community (public and private) facilities and public recreational spaces (for physical activity) and routes (community severance, cycling and walking). The area is defined in Section 9.4: Study areas (refer to **Chapter 9: Community**).
2. **Chapter 5: Air quality and odour.** Changes to emissions to air from aircraft, airside plant and vehicles, combustion plant (e.g. energy centre) and road traffic vehicles (oxides of nitrogen, nitrogen dioxide and particulate matter) have the potential to cause health effects. The study area for air quality is described in Section 5.4: Study area, which includes the area over which odour will be considered (refer to **Chapter 5: Air quality and odour**). Where the air quality assessment finds air quality effects occurring remote from the study area identified at the scoping stage, the associated health effects will also be assessed. For construction dust, the study area is anticipated to be 350m from any particular boundary of each relevant DCO Project site and 50m from routes used by construction vehicles on the public highway/haul roads up to 500m from the site entrance(s).
3. **Chapter 10: Economics and employment.** The benefits of employment generated by the DCO Project are expected to be experienced by those living around the Airport. In addition, wider effects of new economic activity in the labour market are expected to be experienced over a larger area. The study area for this topic is described in Section 10.4: Study areas (refer to **Chapter 10: Economics and employment**).
4. **Chapter 13: Landscape and visual amenity.** DCO Project activities may affect visual amenity (for example, light pollution). The Zone of Theoretical Visibility will be used as the basis for assessment which is described in Section 13.5: Sources of data used for scoping (refer to **Chapter 13: Landscape and visual**).
5. **Chapter 16: Noise and vibration.** Changes in sound exposure from aircraft (in the air and on the ground) and other sources such as road noise and rail noise have the potential to cause health effects. Noise emissions from aircraft are expected to cover an area that extends several kilometres around the land being considered for the DCO Project. The study area for noise is described in



Section 16.4: Study areas (refer to **Chapter 16: Noise and vibration**). For construction noise, the study area is anticipated to be up to 300m from any construction activity.

- 12.4.6 The study areas identified above are sufficiently wide to capture all other health determinants likely to be affected by the DCO Project. As the design and consultation processes progress and the DCO Project is refined, the study areas may continue to evolve to accommodate any changes.

12.5 Sources of data used in scoping

- 12.5.1 For the purposes of collecting baseline data, the wider study area in Section 9.4 has been used. This is considered to be an appropriate geographic extent to capture DCO Project activities and impacts that may result in health effects. This area includes some or all of the following Local Planning Authorities: London Borough of Hillingdon, Slough Borough Council, London Borough of Hounslow, Spelthorne Borough Council, South Bucks District Council, The Royal Borough of Windsor and Maidenhead, Runnymede Borough Council, Elmbridge Borough Council and London Borough of Ealing.
- 12.5.2 This will be kept under review with further baseline data collected as required should there be any changes to study areas.

Desk study

- 12.5.3 The main sources of data used for scoping are:
1. Demographic, deprivation and health data as referenced in **Appendix 9.2: People, place and community baseline**
 2. Health priorities: Joint Strategic Needs Assessments (JSNAs) and Joint Health and Wellbeing Strategies (JHWSs) are published by local agencies responsible for public health. These documents review the needs of the population and set out the health issues that are relevant at a local level. The JSNAs covering the inner and outer components of the proposed study area have been reviewed to inform the scope of the assessment and are summarised in **Appendix 12.1: Local Planning Authority health priorities**
 3. Revised draft Airports National Policy Statement: Health Impact Analysis, shortlisted schemes⁵. This document sets out some of the health issues relevant in comparing proposals for expansion at different airports in south-east England. The document identifies scientific evidence and studies that are relevant in considering the potential health impacts of construction and operation of an airport.



12.6 Baseline conditions

- 12.6.1 **Appendix 9.2** provides baseline information relating to health. This information includes information characterising demography, deprivation, health indicators, employment and social infrastructure. **Chapter 5: Air quality and odour** describes the air quality baseline conditions and **Chapter 16: Noise and vibration** describes the noise baseline conditions.
- 12.6.2 **Appendix 12.1** provides a summary of the health issues and priorities identified in the JSNAs and JHWSs that has informed the scope of the assessment – shaping the technical scope and potential receptors. Common themes highlighted by the JSNAs and priorities identified in the JHWSs include:
1. The need to focus on prevention of disease and early death through actions such as encouraging exercise, lowering risky levels of alcohol intake, smoking cessation services and early diagnosis
 2. The importance of meeting the needs of children, including tackling childhood obesity, promoting positive mental health, ensuring children are school-ready and supporting vulnerable families
 3. The prioritisation of mental health, including promoting positive mental health and improving mental health services
 4. The importance of addressing the needs of older people, including enabling independence in older age, safeguarding older people, reducing excess winter death and improving care and support
 5. The need to address inequalities in health including targeting communities experiencing poor health, children living in poverty and deprived neighbourhoods
 6. The recognition of the importance of addressing the wider determinants of health by promoting environments that have appropriate access to: housing; outdoor spaces, including green spaces, that are safe and clean; and employment and training opportunities
 7. The use of the life-course approach to understanding how an individual's health needs change as they age
 8. Identifying and meeting the needs of vulnerable groups with particular needs, including looked after children, people with learning disabilities and frail older people.



12.7 Likely significant effects requiring assessment

12.7.1 The DCO Project has the potential to lead to positive and negative health effects. The health effects described in this section are considered to require assessment.

Table 12.3 Likely significant health effects

Activity	Effect	Receptor
Construction		
Land required for the DCO Project (temporary and permanent) and changes to local traffic routes	Living conditions: Relocation and change in living conditions for those being relocated.	Residents affected by relocation
	Social cohesion: Change in number of people living in the community (i.e. those not subject to residential relocation) and accessing community services causing a disruption to existing social networks and feelings and perceptions of their community.	Residents affected by relocation
	Access to services: Change in ability of local people to access public services, including health and social care, educational and recreational amenities and any effect on the viability of these resources.	Residents Users of community facilities Operators of community facilities
	Lifestyle: Change in opportunities for access to formal and informal open space affecting physical activity and active lifestyles.	Residents Users of open space and sports facilities
	Lifestyle: Change in local traffic and transport (including community severance) could influence the use of active travel modes (cycling and walking) and therefore affect active lifestyles.	Residents Commuters
Construction activity, traffic and workforce	Environment: Use of construction plant and construction traffic may generate noise and vibration, emissions to air (including dust and odour) and changes to visual amenity (including light pollution) which may affect health and wellbeing.	Residents Users of schools and medical and social care facilities
	Economy: Changes in employment as a result of generation of a construction workforce and small loss of existing jobs due to impacts on a small number of commercial properties.	Working age population
	Economy: Changes to local economic conditions due to the presence of a construction workforce and procurement of local goods and services.	Operators of local amenities
	Social cohesion: Presence of a construction workforce can be a source of concern for the local community.	Residents



Activity	Effect	Receptor
Operation		
Operation workforce	Economy: Changes in employment as a result of generation of an operational workforce (including an estimated 40,000 new jobs available to people in the local area as well as indirect impacts affecting changes in income and economic development).	Young people and working age population
Changes in sound exposure	Environment: Changes in sound exposure as a result of additional ATMs (and other noise and vibration sources), a different aircraft fleet mix and different operating regimes. Noise (unwanted sound) is a pathway for health effects relating to annoyance; sleep disturbance; cardiovascular impacts and cognitive development of children (assessed in Chapter 16: Noise and vibration and also reported in the health assessment).	Residents Users of schools and medical and social facilities Operators of schools and medical and social care facilities
Changes in emissions to air	Environment: Changes to emissions to air from aircraft, airside plant and vehicles, combustion plant (e.g. energy centre) and road traffic vehicles (oxides of nitrogen, nitrogen dioxide and particulate matter) have the potential to cause health effects, principally affecting respiratory and cardiovascular health.	Residents Schools Healthcare facilities
Changes in distribution of road traffic	Safety: Changes in the road layout and road traffic may result in a change in road traffic incidents (effects associated with road safety).	Road users
Existence of an expanded airport	Access to services: Change in the number of people accessing and demanding public healthcare services (additional passengers and airport workers).	Residents Airport workers Healthcare operators
	Lifestyle: Changes in the opportunity to access leisure travel and the impacts on lifestyle benefits for passengers.	Passengers
	Social cohesion: Changes in how local people feel about their community, sense of place and wellbeing.	Residents

12.8 Effects not requiring assessment

- 12.8.1 Many factors are determinants of health and the proposed scope of health effects requiring assessment seeks to define the focus of the health assessment to those effects associated with an expanded airport.
- 12.8.2 In addition, other assessments in the EIA are considering issues that relate to the determinants of health as set out in Table 12.4. While these are not specific assessments of human health effects, a watching brief of these assessments will be maintained. Where these assessments indicate that significant effects occur that influence a determinant of health, the potential for human health effects will be



considered within the health assessment. To deliver a proportionate assessment, these issues would not be the focus of the health chapter.

Table 12.4 Effects relevant to determinants of health reported in other assessments

EIA Scoping Report chapter	Effects being assessed
Chapter 8: Climate change	The climate change assessment considers resilience to global climate change and the measures that will need to be taken by the expanded Airport to adapt to changing climate patterns. The potential impact of these changing climate patterns (e.g. temperature change, extreme weather events) will be assessed and measures proposed to manage effects on the Airport and the people that use it. Therefore, potential health impacts associated with a changing global climate do not form part of the health assessment.
Chapter 14: Land quality	Standard industry practices set out the approach to assessing and managing risks during construction activities where there is potential for workers to come into contact with contaminated soil or hazardous substances. The risks to construction workers from exposure to contamination in soil is covered in Chapter 14: Land quality and is therefore not duplicated in the health assessment.
Chapter 15: Major accidents and disasters	Considers the likelihood and consequences of potential man-made and natural disasters arising from the DCO Project affecting the local community. This includes accidents or disasters originating from the DCO Project as well as external events (man-made or natural). Although outbreaks of communicable diseases are rare, they do occasionally occur. The measures currently in place to detect, prevent and treat such diseases are expected to be applied to the expanded Airport, with facilities aligned to the demands created by an expanded airport. The emergency response measures, including the involvement of local health providers, is expected to be provided with continuity and therefore are not included in the health assessment.

- 12.8.3 As part of the consenting process, the DCO Project will be scrutinised by the Environment Agency to ensure that the design proposals do not present a risk of flooding or danger to water quality that would endanger lives or human health. It is assumed therefore that there will be no likely significant effects to population health from flooding and water quality / pollution due to the DCO Project. Similarly, the existing controls in place relating to handling hazardous waste (to avoid harmful effects on the environment and humans) are also regulated by the Environment Agency. These issues, therefore, are not within the scope of the health assessment.
- 12.8.4 In addition, standard construction practice involves pest control measures and these will be deployed on the DCO Project. Relevant Local Planning Authorities



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will scrutinise the proposed measures to control pests as part of commitments to construction practice. Therefore, the likely risk to human health will be managed and regulated and therefore pests are not within the scope of the health assessment.

12.9 Proposed approach to the assessment

- 12.9.1 The study areas are set out in Section 12.4: Study areas. These will be kept under review and as the design and consultation processes progress, the DCO Project is refined and related topic assessment study areas (e.g. noise) are confirmed, the study areas may evolve as appropriate.
- 12.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the main topics considered in assessment of health effects are likely to remain the same. The scope of the health assessment and methodologies will however be kept under review.
- 12.9.3 The assessment of health covers all aspects of the DCO Project and does not seek to assess different components of the DCO Project individually or in isolation. Where individual health impacts only relate to a particular component of the DCO Project, this will be identified.

Additional baseline information required

- 12.9.4 As described in Section 12.4, should the study area change in response to the evolving design, the need for any additional baseline data for health may be reviewed and updated.
- 12.9.5 The baseline information will, in any event, be updated in advance of the assessment where information is available. This includes: demographic information, new strategies and publications relevant to the management of health and wellbeing in the study area; and information relating to recorded health incidence relating to mortality and morbidity.

Assessment years

- 12.9.6 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the health assessment specifically.
- 12.9.7 The assessment cases relevant to the health assessment are:
1. Current baseline: This is dependent on the availability of baseline data and information but it is expected that the most recent data will be used. This will



vary depending on the data source, but it is likely that this will be 2016 for many aspects of the health assessment

2. Future baseline: This is expected to be the full year of operations prior to the opening of a third runway. It is possible that the background environmental and social conditions may change or effects associated with operating a two-runway airport may change from the baseline year. This will be determined as far as possible using future population projections.
3. Construction: This is expected to be where the maximum environmental effects during the construction phase are experienced, for example, the highest number of construction vehicle movements, highest number of workforce, the activities that have greatest impact on environmental amenity.
4. Operation: It is expected that the assessment of operational effects will consider potential effects associated with several scenarios. The scenarios include: (i) effects experienced in the first year of operations of the expanded Airport; (ii) effects experienced when the Airport is operating at maximum air transport movement (ATM) capacity (may be more than one of these); and (iii) effects experienced at the point of maximum environmental effects, which may be a different point for each environmental topic.

12.9.8 Health impacts for construction and operation will be compared to the future baseline. The construction phasing may mean that some elements of the DCO Project are operational while construction of other elements remains ongoing and therefore people may experience impacts from the different phases at the same time. This will be reflected in the assessment.

12.9.9 Where the health assessment is informed by an assessment conducted by another EIA topic, specifically noise, transport, visual, air quality and employment, the assessment for that topic will be applied in the health assessment.

Construction and operation assessment methodology

12.9.10 This section sets out the proposed approach to assessing health effects. There is no formal guidance on considering health within the context of EIA. The Institute for Environmental Management and Assessment (IEMA) have published 'Health in Environmental Impact Assessment: A Primer for a Proportionate Approach'¹¹ which provides a high-level introduction to considering public health in EIA.

12.9.11 Key aspects of the approach to assessing health effects are:

1. Health pathways

¹¹ IEMA, Health in Environmental Impact Assessment: A Primer for a Proportionate Approach, 2017



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2. Receptors
3. Assessment
4. Evaluation of significance
5. Reporting.

12.9.12 Further detail on each of these is provided in the following sections.

Health pathways

12.9.13 It is important to establish credible health pathways; these determine the relationships between project activities and potential health impacts on the population and therefore help to establish the scope of the assessment. The approach to establishing health pathways is set out in the three stages below. This approach is intended to ensure that there is an established cause and effect relationship between a project activity and a potential health impact on the population; typically the relationship is established through scientific evidence and/or stakeholder concerns.

Source-pathway-receptor

12.9.14 Given the potential range of health determinants, the application of a source-pathway-receptor model can be used to test the plausibility of a potential impact occurring. The model requires all three aspects to be in place for a plausible impact to be considered, as set out in Graphic 12.2.



Graphic 12.2 Source-pathway-receptor model for health effects²

Source	Pathway	Receptor	Plausible Health Impact?	Explanation
✗	✓	✓	No	There is not a clear source from where a potential health impact could originate.
✓	✗	✓	No	The source of a potential health impact lacks a means of transmission to a population.
✓	✓	✗	No	Receptors that would be sensitive or vulnerable to the health impact are not present.
✓	✓	✓	Yes	Identifying a source, pathway and receptor does not mean a health impact is a likely significant effect; health impacts should be assessed (describing what effect will occur and its likelihood) and likely health effects are then evaluated for significance.

Strength of evidence

- 12.9.15 In considering the source-pathway-receptor relationship, the strength of evidence that underlines the relationship between a change in a determinant of health and a change in health outcomes is an important factor in determining the likelihood of an effect. Typically, relationships that are underpinned by good quality scientific research showing a good strength of evidence for an association and/or have been adopted by bodies such as the WHO are deemed to have the highest degree of credibility and certainty. The focus of such research to date has been most extensive on negative health effects.
- 12.9.16 Peer reviewed scientific literature provides the evidence that links activities associated with development (in this case airport expansion) with possible changes in health outcomes. This evidence can be from quantitative and from qualitative studies that have been peer-reviewed. Some approaches have been prescribed and adopted in appraisal methodologies for infrastructure projects, for example WebTAG. An absence of research does not imply the absence of a relationship between a project activity and a change in health outcomes, but it does suggest that there is a higher degree of uncertainty.
- 12.9.17 Where there is a gap or lack of consensus in the scientific literature the decision as to whether there is a credible ‘pathway’ will be a professional judgement which will be informed by the views of public health stakeholders.



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Likelihood of an impact occurring

- 12.9.18 In conducting scoping, a precautionary approach towards the identification of risk has been balanced with a pragmatic approach to managing risk. The design of the DCO Project is an important influence on the likelihood of health effects occurring, whether beneficial or adverse.
- 12.9.19 The source-pathway-receptor model establishes the plausibility of a potential effect. This is part of the test for likelihood. Once a plausible association is established between the DCO Project's activities and health outcomes the conclusion on 'likelihood' is also informed by a qualitative judgement on the probability of the effect occurring. If the effect could only occur under very rare conditions (or committed mitigation, design principles or regulatory prerequisites would be in place) then the effect may be plausible but not probable and therefore not likely.
- 12.9.20 For example, flooding, and the associated health effects, was considered as a topic for assessment. The DCO Project design will take full account of the risks from flooding and consent for the application would only be given once the Regulator (Environment Agency) is satisfied that the design of the DCO Project adequately manages the risk of flooding. Therefore, the health effects associated with flooding, such as loss of life through drowning, while potentially a plausible health pathway, would not be probable due to the regulatory prerequisite requirements. The test for likelihood is therefore not met. Flooding has therefore been scoped out of the Health chapter as not having the potential to be a likely significant health effect of the DCO Project.
- 12.9.21 For those effects that are considered likely, the assessment and reporting will focus on whether or not the likely effects are significant. The scope only considers those health effects that are likely to occur as a result of the DCO Project.

Receptors

- 12.9.22 The assessment will focus on population health and it will not make judgements about effects on specific individuals.
- 12.9.23 For each topic the assessment will report the potential effects on two types of population. The first will be the general population. The second will be vulnerable groups within the general population. This will ensure that the assessment takes account of the ways in which the DCO Project may affect health inequalities.
- 12.9.24 The general population scope of the health assessment considers: residents of and visitors to local communities (in the inner and wider study areas); the workforce and passengers of Heathrow (current and future); and construction workers for the DCO Project. However, the focus is on community effects.



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- 12.9.25 The effects of the DCO Project may be experienced differently by different population groups; population groups can be identified by factors including (but not limited to) age, gender, ethnicity, socio-economic status, place of residence or pre-existing health status.
- 12.9.26 Examples of potentially vulnerable groups include:
1. Children and young people
 2. Older people
 3. Black and Minority Ethnic Groups
 4. Faith groups
 5. Disabled people living with a physical or mental impairment
 6. Economically inactive or unemployed
 7. People living on low incomes
 8. People living in areas of deprivation
 9. People with existing poor health status
 10. People living in geographic or social isolation
 11. Shift workers
 12. Carers.
- 12.9.27 In addition to considering where impacts may have a different impact on vulnerable groups, the health chapter in the ES will also report where impacts occur in-combination, affecting resources, communities, or locations simultaneously. The approach to the assessment of in-combination effects is provided in Section 4.7: In-combination effects.

Assessment

- 12.9.28 A number of other EIA topics are relevant to the determinants of health and will provide inputs to the potential effects requiring assessment. These are:
1. Air quality and odour
 2. Community
 3. Economics and employment
 4. Landscape and visual amenity
 5. Noise and vibration
 6. Traffic and transport.



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- 12.9.29 The assessment of each health effect will draw on quantitative and qualitative analysis and stakeholder engagement. The assessments will be professional judgements with appropriate reference to supporting evidence.
- 12.9.30 Quantitative analysis will be used where information is available to allow potential health outcomes to be modelled in a proportionate manner. In these cases, an exposure-function relationship has been observed between exposure and a specific health effect and chance, bias, and confounding factors can be ruled out with reasonable confidence. Generally speaking cause and effect responses that have been recognised by bodies responsible for the protection of health, e.g. World Health Organization and or government guidance (such as WebTAG).
- 12.9.31 Table 12.5 sets out the potential health effects where the methodology for the assessment of health effects will draw predominantly on quantitative analysis.

Table 12.5 Health effects subject to quantitative analysis

Source	Potential health effect	Methodology
Environment: Changes in sound exposure as a result of additional ATMs (and other noise sources), a different aircraft fleet mix and different operating regimes	Morbidity (for example, cardiovascular impacts - acute myocardial infarction (AMI) and hypertension) Annoyance Sleep disturbance Disruption of function (e.g. cognitive impairment in schools)	The methodology for assessing these effects is described in Chapter 16: Noise and vibration .
Environment: Changes to emissions to air from aircraft and road traffic vehicles of nitrogen dioxide and particulate matter	Mortality (for example, deaths attributable to pollutants) Morbidity (for example, changes in hospital admissions)	Chapter 5: Air quality and odour will identify the changes to emissions to air considering compliance with Air Quality Objectives and EU limit values. Pollutant concentrations from the air quality assessment will be used in the health assessment. Epidemiological studies will be used to provide risk coefficients for mortality and morbidity indicators attributable to nitrogen dioxide and particulate matter. The risk coefficients to be used will be based on latest evidence published by Defra and recognised bodies such as Committee on Medical Effects of Air Pollution (COMEAP).



Source	Potential health effect	Methodology
Safety: Changes in the road layout and road traffic volumes may result in a change in road traffic incidents (effects associated with road safety)	Mortality (for example, change is risk of death from road traffic accident) Morbidity (change in risk of injury from road traffic accident)	The methodology for the health assessment will draw on work conducted to inform the Transport Assessment, including modelling. This includes calculating the total distance travelled along each link (section of road) in the transport model by vehicles over the course of a year. National accident rates will be identified (the geographic area covered by the transport model extends over many Local Planning Authority boundaries). The accident rates for the total distance travelled, compared with the DCO Project and without the DCO Project. The difference will provide the change in risk.

- 12.9.32 Qualitative analysis will be applied where the strength of evidence is insufficient to conclude that an acceptable exposure-function exists. This principally relates to impacts where the health outcome is likely to result in a change in wellbeing, rather than a mortality or morbidity. The inputs to qualitative analysis include quantitative information where possible (e.g. estimates of numbers of people affected), in addition to qualitative research measures such as the outputs from consultation and stakeholder engagement.
- 12.9.33 Table 12.6 sets out the potential health effects where the methodology for the assessment of health effects will draw predominantly on qualitative analysis.

Table 12.6 Health effects subject to qualitative analysis

Source	Potential health effect	Methodology
Living conditions: Relocation and change in living conditions for those being relocated	Wellbeing	The methodology will draw on the outputs of Chapter 9: Community and identify the number of people likely to be subject to compulsory acquisition. A review of evidence will identify the likely positive and negative impacts that could be expected to be experienced by the population, including vulnerable groups. An overview of the local demography will provide inputs to the assessment of types and numbers of people affected.



Source	Potential health effect	Methodology
		The methodology will consider the existing mitigation measures (property schemes, compensation, hardship schemes and assistance in relocation).
<p>Access to services: Change in ability of local people to access services, including health and social care, educational and recreational amenities and any effect on the viability of these resources Change in the number of people accessing and demanding healthcare services (additional passengers and airport workers).</p>	Wellbeing Health outcomes associated with receiving medical attention	<p>The methodology will identify the community facilities that are affected by the DCO Project. This includes land required for the DCO Project, routes experiencing stopping up or diversion, facilities where the user catchment is expected to change and access to public transport to enable subsequent access to facilities. The assessment will consider the likely implications for human health as a result of a change to community facilities themselves (e.g. availability, functioning) or changes to how they are accessed (e.g. transport routes)</p> <p>Issues of demand, capacity and viability will be identified, considering health care (not just medical provision).</p>
<p>Social cohesion: Change in number of people living in the community and accessing community services. Presence of a construction workforce Changes in how local people feel about their community, sense of place and wellbeing</p>	Wellbeing	<p>The methodology will draw on the outputs of Chapter 9: Community and the results of stakeholder engagement to identify the qualitative issues that could affect how people feel about their environment and any changes to social networks.</p> <p>The results from stakeholder engagement will be reviewed to identify particular concerns of the community. The concerns will be reviewed against the mitigation (embedded mitigation and proposed management plans) to identify residual concerns affecting wellbeing.</p>
<p>Lifestyle: Change in opportunities for access to formal and informal open space. Change in local traffic could influence the use of active travel modes (cycling and walking). Changes in the opportunity to access leisure travel and the impacts on lifestyle benefits for passengers</p>	Health outcomes associated with cardiovascular and respiratory health Wellbeing	<p>The methodology will identify whether the opportunities for physical activity would change as a result of the DCO Project. This includes consideration of:</p> <ol style="list-style-type: none"> 1. Change in the number, amount and accessibility of formal and informal open space, drawing on the outputs of Chapter 9: Community. 2. Change in the routes and layout of local roads (including community severance) and walking and cycling provision to identify any change in non-motorised traffic use.



Source	Potential health effect	Methodology
		3. Change in the number of leisure passengers using the airport and qualitative evidence on changes to wellbeing.
Environment: Use of construction plant and construction traffic may generate noise, air quality (including odour) and changes to visual amenity	Wellbeing	The methodology will draw on the construction assessments in a number of chapters in the EIA to identify whether any residential receptors would be expected to experience negative impacts from a combination of construction activities and the level of disturbance could be considered to be a cause of stress and anxiety.
Economy: Changes in employment as a result of construction and operation activities	Wellbeing	The methodology will draw on Chapter 10: Economics and employment to identify the likely numbers of jobs that will be generated or lost in the construction and operation phases. There is some evidence to suggest that moving from employment to unemployment has a negative impact on health. The methodology will explore evidence for positive impacts on health from gaining employment or avoiding negative impacts on health. In addition, evidence linking changes in indirect and induced employment (and economic development from potential increase in clustering of businesses near to the Airport) and the relationship to health will be reviewed.

Evaluation of significance

12.9.34 The evaluation of whether effects of the Project on human health are significant is a professional judgement that will be presented as a narrative. This will follow three steps.

1. The health effects will be described
2. A set of questions will be used to frame the judgement as to the significance of a particular effect on human health
3. The effects on health will be categorised on a scale of major, moderate, minor and negligible (and therefore whether the effect on human health is significant or not).

12.9.35 Each is described further below.



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Step 1: Describing the potential effects on health

12.9.1 For each of the potential health effects, the following factors will be considered:

1. Direction: Whether the impact is positive, negative or neutral
2. Relationship: Whether the impact is a direct relationship (e.g. exposure) or an indirect relationship (e.g. access to services), affecting physical and/or mental health and wellbeing
3. Severity: the type of health outcome affected (e.g. affecting mortality, disease, nuisance, well-being), the type of affect (e.g. onset of new conditions, affecting existing conditions, change to day-to-day functioning) relative to the baseline conditions
4. Exposure: the degree of exposure (e.g. low concentrations over a long period, high concentrations over a short period), variation in exposure based on their proximity to the source and existence of existing regulatory standards
5. Extent: the size of the population likely to experience the health effect or the extent of usage of a particular facility or service
6. Frequency, duration and permanence: the time period over which the effect will occur, how often the population would be affected, and the extent to which the health effect is reversible
7. Health status: the existing health status and deprivation of the population, including conditions that would make the population more susceptible to the change
8. Resilience: the ability to absorb the impact, as influenced by their adaptability, outlook (views about the Project), life stage and ability to access alternatives
9. Vulnerable groups and inequalities: considering the general population and the vulnerable groups listed in paragraph 12.9.26 and how these groups may experience effects differently.

Step 2: Framing judgement on significance

12.9.2 The questions in Table 12.7 below will guide and inform the professional judgement as to the categorisation of the health effect against the framework set out in Table 12.8, using which each health effect will be assigned a category.



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Table 12.7 Example guide questions framing the professional judgement on health significance

Evidence sources	Guide questions
Scientific literature	<p>Is there a sufficient strength of evidence from sufficiently high quality studies to support an association between the project change, a relevant determinant of health and a relevant health outcome?</p> <p>Does the literature indicate thresholds or conditions for effects to occur?</p> <p>Are particular population groups identified as being particularly susceptible?</p>
Baseline conditions	<p>Are relevant sensitivities or inequalities identified in the scientific literature present?</p> <p>Does the baseline indicate that conditions differ from relevant local, regional or national comparators?</p> <p>Are their geographic or population features of the baseline that indicate effects could be amplified?</p>
Health priorities	<p>Have local, regional or national health priorities been set for the relevant determinant of health or health outcome (e.g. in JSNAs or Health and Wellbeing Strategies)?</p>
Consultation responses	<p>Has a theme of local, regional or national consultation responses related to the relevant determinant of health or health outcome?</p>
Regulatory standards	<p>Is the change one that would be formally monitored by regulators?</p> <p>Are their regulatory or statutory limit values set for the relevant context?</p> <p>Has EIA modelling predicted change that exceed thresholds from the scientific literature or set by regulators?</p> <p>Are their relevant international advisory guideline limit values (e.g. by the World Health Organisation)?</p>
Policy context	<p>Does local, regional or national government policy raise particular expectations for the relevant project change, determinant of health or health outcome (e.g. levels should be as low as reasonably practicable)?</p> <p>Is there a relevant international policy context (e.g. treaties or conventions)?</p>

Step 3: Categorising effects on human health

- 12.9.3 It is important to note that a health effect does not need to meet all of the characteristics to be assigned to a specific category. The assessment will provide the justification as to why a health effect has been assessed to be in a particular category; this will principally be based on the majority of shared characteristics, the interrelationships of characteristics and applying professional judgement.



Table 12.8 Categorising effects on human health

Category	Typical characteristics relevant to health effects in this category
<p>Major (positive or negative)</p>	<p>Magnitude characteristics:</p> <ul style="list-style-type: none"> • A strong evidence base that risk factors for a permanent, progressive or irreversible health condition would be affected (positively or negatively) • Permanent or irreversible exposure over a long timescale <p>Baseline and regulatory standards characteristics:</p> <ul style="list-style-type: none"> • Substantial change (positive or negative) from the baseline position • A change in whether regulatory standards are met or exceeded <p>Sensitivity characteristics:</p> <ul style="list-style-type: none"> • Highly deprived communities affected • A large widening or narrowing of inequalities • Most people in a community affected (positively or negatively) <p>Other contextual characteristics:</p> <ul style="list-style-type: none"> • A direct and large contribution (positive or negative) to a recognised health priority • A strong and consistent theme of consultation by both health stakeholders and the public on the issue (positive (support) or negative (concern or uncertainty)) • Whether published national or local government policy expectations are met or not-met
<p>Moderate (positive or negative)</p>	<p>Magnitude characteristics:</p> <ul style="list-style-type: none"> • A strong evidence base that risk factors for a non-permanent, reversible, non-progressive health condition would be affected (positively or negatively) • Occasional or reversible exposure over a medium timescale <p>Baseline and regulatory standards characteristics:</p> <ul style="list-style-type: none"> • A small change (positive or negative) from the baseline position <p>Sensitivity characteristics:</p> <ul style="list-style-type: none"> • A community with average deprivation affected • A small widening or narrowing of inequalities • Many people in a community affected (positively or negatively) <p>Other contextual characteristics:</p> <ul style="list-style-type: none"> • An indirect or small contribution (beneficial or adverse) to a recognised health priority • A minority theme of consultation or with inconsistent views between health stakeholders and the public on the issue (positive (support) or negative (concern or uncertainty))
<p>Minor (positive or negative)</p>	<p>Magnitude characteristics:</p> <ul style="list-style-type: none"> • A strong evidence base that risk factors for transient, temporary symptoms (e.g. irritation, nausea or headache) would be affected (positively or negatively) • Infrequent or reversible exposure over a short timescale <p>Baseline and regulatory standards characteristics:</p> <ul style="list-style-type: none"> • A slight change (positive or negative) from the baseline position with evidence available to demonstrate change



Category	Typical characteristics relevant to health effects in this category
	<p>Sensitivity characteristics:</p> <ul style="list-style-type: none"> • A community with low deprivation affected • A slight widening or narrowing of inequalities with evidence available to demonstrate change • Few people in a community affected (positively or negatively) <p>Other contextual characteristics:</p> <ul style="list-style-type: none"> • An indirect or slight contribution (beneficial or adverse) to a recognised health priority • A few individual consultation responses on the issues, but not a theme of consultation for health stakeholders or the public on the issue (positive (support) or negative (concern or uncertainty))
Negligible	<p>Magnitude characteristics:</p> <ul style="list-style-type: none"> • No discernible change in health or wellbeing within normal variations • No discernible change in exposure levels <p>Baseline and regulatory standards characteristics:</p> <ul style="list-style-type: none"> • No discernible change (positive or negative) from the baseline position <p>Sensitivity characteristics:</p> <ul style="list-style-type: none"> • No discernible widening or narrowing of inequalities <p>Other contextual characteristics:</p> <ul style="list-style-type: none"> • No links to a recognised health priority • No consultation responses on the issues.

12.9.4 Following categorisation of the health effects using the categories in Table 12.8, those health effects rated as ‘major’ (positive or negative) will be rated as ‘significant’ for the purposes of compliance with EIA Regulations.

12.9.5 To provide focus to the effects of the Project as a whole, a finding of a ‘moderate’, ‘minor’ or ‘negligible’ effect does not imply that a particular effect is somehow not important to people’s lives. The word ‘significant’ is used here in the technical context of EIA. It is recognised that all changes that affect the health of individuals and populations are important.

Reporting

12.9.6 Impacts on the general population will be reported for each determinant of health where likely significant effects are expected, including appropriate reference to health outcomes. In addition, where specific population groups are predicted to experience significant effects that differ from the general population, those effects will also be reported.

12.9.7 Where a particular community is predicted to experience multiple impacts on health, these effects will be reported in the in-combination effects assessment (refer to Section 4.7: In-combination effects). Cumulative health effects resulting from the combination of impacts from the DCO Project and other developments



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will also be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

12.10 Approach to mitigation

Components of mitigation

- 12.10.1 The assessment of health effects will result in measures that will help to avoid, reduce or to compensate for negative effects on health and wellbeing and measures that aim to enhance positive effects on health and wellbeing. This is in addition to mitigation proposed to reduce effects identified by source topics, for example, air quality and noise. Measures will be informed by the ambitions of Heathrow 2.0¹² which seeks positive outcomes for people who live near Heathrow or who work at Heathrow.
- 12.10.2 The main components of mitigation, management and enhancement are:
1. Embedded measures for mitigation or enhancement which are part of the design, construction method or operational procedures and which avoid potential significant negative health effects and which ensure opportunities for health improvement
 2. Measures to reduce impact on health and wellbeing
 3. Measures to replace, to off-set or to compensate for negative health effects and measures to enhance positive health effects
 4. Measures to manage likely potential health effects in construction or operational activities, including opportunities for health improvement for the workforce and communities
 5. Monitoring, where this could help prevent or better understand future health effects, and adaptive management to respond to any unforeseen effects.
- 12.10.3 The application of mitigation measures will not be limited to health effects that have been identified as being ‘significant’.
- 12.10.4 The significant residual effects on health and wellbeing will be reported. These are the effects that remain once the mitigation and enhancement measures have been applied.

¹² Heathrow 2.0: Our plan for sustainable growth, <https://your.heathrow.com/wp-content/uploads/2017/01/Heathrow2.0.pdf> (accessed 30 April 2018)



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Mitigation proposals

- 12.10.5 A number of measures have already been identified for the DCO Project as part of embedded measures for mitigation on issues that influence the determinants of health for design, construction and operation:
1. Elements of the airport masterplan design and layout of the ground based airport development have been developed to minimise the number of properties required and minimise noise effects. For example, runway length, runway position and displaced thresholds for air noise; taxiway locations, bunding, barriers and landscaping for ground noise
 2. Airport operating procedures include development of proposals for a runway alternation scheme that provides predictable periods of respite from aircraft noise and consideration of principles to enable alternatives for sharing of noise exposure (e.g. preference for operating direction)
 3. Minimisation of the effects of noise from night flights through consideration of the proposed ban on scheduled night flights for a 6.5 hour period (time to be agreed through consultation) between 23:00 and 07:00, the fleet that operates and the way in which the operate uses the available runways
 4. Development of proposals for compensation including a noise insulation scheme for residents and community buildings (including schools)
 5. Provision of compensation package for residents within the Compulsory Purchase Zone and voluntary compensation package for residents in the Wider Property Offer Zone, along with hardship policies and home relocation assistance scheme
 6. Development of a surface access strategy for the Airport with initiatives to create a public transport focused Airport, make public transport easier to use, invest in local transport solutions, provide a resilient and reliable road network and maintain community networks.
- 12.10.6 A draft Code of Construction Practice (CoCP) will be produced, setting out a series of proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, management and control during construction, to mitigate potential impacts upon people and the environment.
- 12.10.7 During construction, movement of construction freight by road will be managed using a Delivery Management System that allocates pre-booked delivery slots allowing the time of each delivery to be controlled, managing the flow of heavy goods vehicles (HGVs) arriving at the site entrances, spreading the deliveries through the day and avoiding the peaks where possible. The option of creating a freight parking area near the site, to act as a buffer for parking and holding HGVs when required, is also being investigated. The routing of construction traffic will be



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carefully planned to ensure that, where practicable, construction vehicles are routed away from areas that are more sensitive to changes in air quality and local communities.

- 12.10.8 Opportunities to reduce the number of construction workers on site by increasing off site manufacturing and pre-fabrication and improving on-site construction methods is also being investigated. The majority of the construction workforce will travel to site each day by public and sustainable transport modes. Existing bus routes could be supplemented by the Project to preserve capacity for other passengers. Workforce Travel Plans will be developed to encourage the use of the public transport and sustainable modes of transport. For the minority of workers driving to site, car parking will be provided near the site and a shuttle bus service will transport workers to their site offices or workplaces. The parking facilities would be located in strategic locations near the major access routes to Heathrow.
- 12.10.9 The HCEB will ensure local community views influence the design development process and they will be instrumental in developing mitigation measures and helping to implement Heathrow's commitment to a Community Compensation Fund.

Health management plan

- 12.10.10 The measures put in place to manage health effects will be set out in a management plan, detailing how commitments to managing positive and negative health effects will be secured and implemented. Table 12.9 sets out the proposed contents of the management plan.

Table 12.9 Proposed contents of the health management plan

Theme / Issue	Description
Objective of intervention	Potential health effect requiring intervention and the positive outcome that it seeks to achieve
Intervention	Description of mitigation, management, compensation, enhancement or monitoring
Stage	Point in project cycle at which intervention is aimed (e.g. planning, construction, operation)
Delivery document	Where the commitment will be made in the DCO material (e.g. draft Code of Construction Practice)
Delivery mechanism	How the intervention will be secured (e.g. Section 106 agreement)
Already being implemented by Heathrow?	Whether a continuing initiative or a new initiative



Theme / Issue	Description
Responsibilities	Who is responsible, who needs to be involved, any reporting, monitoring or evaluation required
Trigger	When the intervention takes effect (e.g. opening day of third runway)

Stakeholder feedback

- 12.10.11 The assessment process will seek to capture stakeholder views on measures that could avoid, reduce and manage impacts and feedback on this report is welcomed.



Chapter 13

Landscape and visual amenity



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13. LANDSCAPE AND VISUAL AMENITY

13.1 Introduction

- 13.1.1 This chapter describes the scope of the environmental assessment for the DCO Project as it relates to landscape and visual amenity. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 13.1.2 This chapter describes:
1. The landscape and visual amenity policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. The study area for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the DCO Project on landscape and visual amenity
 7. Effects not requiring assessment
 8. The proposed approach to the assessment
 9. Approach to mitigation.
- 13.1.3 'Landscape' is defined in the European Landscape Convention, Council of Europe (2000), as:
- “...an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.”*
- 13.1.4 Landscape character arises from the pattern of these factors, or elements, that make one landscape different from another and includes perceptual aspects such as tranquillity. In urban areas landscape may be termed townscape, which includes buildings and urban open space; where relevant, landscape is therefore referred to as townscape. Visual amenity considerations relate specifically to views of the landscape afforded to people. These issues, as they relate to the DCO Project, are considered in the proposed scope of landscape and visual impact assessment (LVIA). Landscape and visual issues are related but considered separately as part of LVIA. There are also some areas in which the assessment of landscape and visual effects will be informed by the assessments undertaken in relation to other topics, particularly nature conservation, the historic environment and noise and vibration. Effects in relation to nature conservation are considered



within **Chapter 6: Biodiversity**, effects in relation to historic character and historic environment features are considered within **Chapter 11: Historic environment**, noise effects are considered within **Chapter 16: Noise and vibration**, and light pollution will be considered within a Lighting Assessment (which will be appended to the Environmental Statement). The landscape and visual amenity assessment will be informed by the assessments described in those chapters and appendices. For example, the assessment of noise impacts from the operation of the DCO project in **Chapter 16: Noise and vibration** will inform the assessment in the LVIA in relation to the tranquillity aspects of landscape, consistent with the guidance in the revised draft Airports National Policy Statement (revised draft ANPS) and the National Policy Statement for National Networks (NN NPS) (see Table 13.1).

13.2 Policy and legislation

- 13.2.1 This section identifies the relevant policy and legislation which has informed the proposed scope of the assessment presented in **Chapter 13: Landscape and visual amenity**. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.

Table 13.1 Policy and legislation relevant to landscape and visual amenity assessment

Relevant Policy / legislation	Relevance to the assessment
International	
European Landscape Convention (Council of Europe, 2000)	The European Landscape Convention (ELC) was signed by the United Kingdom Government in February 2006, ratified in November 2006 and came into effect in March 2007. The ELC is a European Treaty which encourages the integration of landscape considerations into all relevant areas of policy.
United Kingdom	
Revised draft Airports National Policy Statement¹	The revised draft ANPS advises that the applicant should undertake an assessment of any likely significant landscape (encompassing waterscape) and visual impacts and describe them in the environmental statement. The landscape and visual assessment should reference any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the preferred scheme. In addition, the applicant's assessment should take account of any relevant policies based on these assessments in local development documents. The applicant's assessment should include any significant effects during construction of the preferred scheme

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant Policy / legislation	Relevance to the assessment
	<p>and / or the significant effects of the completed development and its operation on landscape components and landscape character, including historic characterisation. This should include assessment of any landscape and visual impacts as a result of the development, for example surface access proposals or aviation activity. The assessment should include the visibility and conspicuousness of the preferred scheme during construction and the presence and operation of the preferred scheme and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation. The revised draft ANPS advises that the decision-making process for a proposed scheme will consider whether the scheme has been designed carefully to avoid or minimise adverse effects in relation to the landscape and whether the visual effects on sensitive receptors, such as local residents, outweigh the benefits of the scheme.</p>
<p>National Networks National Policy Statement²</p>	<p>The National Networks National Policy Statement (NN NPS) advises that the applicant should undertake an assessment of any likely significant landscape and visual impacts and describe them in the environmental statement. The landscape and visual assessment should include reference to any landscape character assessment and associated studies, as a means of assessing landscape impacts relevant to the proposed project. The applicant's assessment should also take account of any relevant policies based on these assessments in local development documents in England. The applicant's assessment should include any significant effects during construction of the project and/or the significant effects of the completed development and its operation on landscape components and landscape character (including historic landscape characterisation). The assessment should include the visibility and conspicuousness of the project during construction and of the presence and operation of the project and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation. The NN NPS advises that the decision-making process for a proposed scheme will consider whether the scheme has been designed carefully to avoid or minimise adverse effects in relation to the landscape and whether the visual effects on sensitive receptors, such as local residents, outweigh the benefits of the scheme.</p>

² Department for Transport, National Networks National Policy Statement, 2014



Relevant Policy / legislation	Relevance to the assessment
National Planning Policy Framework (NPPF)³	<p>The NPPF sets out planning policy for England and identifies a general presumption in favour of sustainable development. The NPPF advises that the planning system should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes; the planning system should also take account of the different roles and character of different areas. The NPPF indicates local planning authorities should plan positively to retain and enhance landscapes and visual amenity within Green Belts.</p> <p>A draft revised NPPF⁴ is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard. The draft revised NPPF additionally advises that planning policies and decisions should ensure that developments respond to landscape character.</p>

13.2.2 Local planning policies have also been considered. Relevant Local Plans are set out in Table 13.3. Due regard will also be given to the Government’s 25 year Environment Plan⁵ where relevant.

13.3 Stakeholder engagement

13.3.1 A summary of engagement undertaken so far and future proposed engagement is provided in Table 13.2.

Table 13.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Natural England	<p>Meetings with Natural England (the government’s advisor in relation to the natural environment, with responsibility for landscape matters) to discuss the approach to assessment and mitigation, including agreement of the study area radius, relevant methodology guidance documents and their application and the use of published landscape character assessment material. These elements are described in the proposed</p>	<p>Continued meetings with Natural England regarding LVIA, including viewpoint selection, and the approach to mitigation.</p>

³ National Planning Policy Framework (NPPF), Department for Communities and Local Government, 2012

⁴ Ministry of Housing, Communities & Local Government, National Planning Policy Framework, Draft Text for Consultation 2018

⁵ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018



Consultee	Engagement undertaken to date	Proposed future engagement
	approaches to assessment and mitigation set out in Sections 13.9: Proposed approach to the assessment and 13.10: Approach to mitigation, respectively.	
Highways England	Meeting with Highways England to discuss the approach to assessment and mitigation, including relevant methodology guidance documents and their application. These elements are described in the proposed approaches to assessment and mitigation set out in Sections 13.9 and 13.10, respectively.	Continued meetings with Highways England regarding LVIA and the approach to mitigation.
Heathrow Strategic Planning Group⁶ (HSPG)	Meetings with HSPG to discuss the approach to assessment and mitigation, including relevant methodology guidance documents and their application. These elements are described in the proposed approaches to assessment and mitigation set out in Sections 13.9 and 13.10, respectively.	Continued meetings with HSPG regarding LVIA, including viewpoint selection, and the approach to mitigation.

13.4 Study area

- 13.4.1 This section sets out the study area for the landscape and visual amenity assessment. The study area radius has been agreed through stakeholder engagement, as set out in Table 13.2.
- 13.4.2 As the design and consultation processes progress and the DCO Project is refined, the study area may continue to evolve to accommodate any changes that are generated. As the study area changes, data collection may also be reviewed and updated.
- 13.4.3 The study area, which is based on the operational infrastructure and the physical development components of the DCO Project, extends to a 5km radius from the maximum amount of land being considered for the full range of options for the DCO Project, as shown on Figure 13.1. Beyond the study area set out in this Scoping Report there are not expected to be significant landscape and visual effects due to intervening distance and landcover limiting the influence of the DCO Project in respect of landscape character and visual amenity. The identification of

⁶ For further information on the HSPG refer to Section 4.9: Engagement.



any further areas to be considered as part of the assessment of effects associated with operational activity will be informed by the noise assessment and the views of stakeholders.

13.5 Sources of data used for scoping

Baseline data collection

- 13.5.1 Baseline data collection is ongoing to obtain information that encompasses the study area described in Section 13.4: Study area. The baseline conditions presented in Section 13.6: Baseline conditions represent a review of the currently available data from desk study and surveys used to inform scoping.

Desk study

- 13.5.2 Within the study area, a preliminary Zone of Theoretical Visibility (ZTV) has been mapped. This is the approximate theoretical area from which the operational infrastructure and development components of the DCO Project are anticipated to be visible and is shown on Figure 13.1. The ZTV modelling used publicly available Environment Agency surface LIDAR (light detection and ranging) Digital Surface Model (DSM) remote sensing data (copyright Environment Agency 2015) to take into account land cover within the study area. This was supplemented by NextMap DSM data (copyright Intermap Technologies 2015) where there were gaps in Environment Agency data. The ZTV forms the starting point for the identification of visual receptors, or those who would have a view of the DCO Project and corresponding representative viewpoints. The ZTV will be updated as the DCO Project progresses.
- 13.5.3 ZTV modelling is limited by the information that informs it. **Chapter 3: The DCO Project** describes indicative height parameters relating to the runway (up to 5m high) and control tower (up to 87m high). These have been taken into account for the purposes of preliminary ZTV modelling. In addition, it has been assumed only for the purposes of generating a preliminary ZTV, to inform scoping of the visual effects assessment, that terminal buildings and associated development within the Airport would be up to 45m high and airport related development or facilities, located off airport, would be up to 24m high. The actual height parameters of the DCO Project are subject to ongoing design development and refinement.
- 13.5.4 The desk study sources of data used in the preparation of this Scoping Report are summarised in Table 13.3.



Table 13.3 Landscape and visual amenity data sources

Source	Data
MAGIC website www.magic.gov.uk	Online map, aerial photograph and designation resources
National character area profiles website www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles	National character area profiles
Environment Agency	Surface LIDAR DSM remote sensing data, 2015
Intermap Technologies	Nextmap DSM data, 2015
Greater London Authority	London Plan, 2016 and London Plan – Draft for public consultation, 2017, regarding relevant designations and related matters.
London Borough of Hillingdon Council	Hillingdon Local Plan: Part 1 Strategic Policies, 2012 and London Borough of Hillingdon Unitary Development Plan, 1998, regarding relevant designations and related matters.
London Borough of Hounslow Council	London Borough of Hounslow Local Plan 2015-2030, 2014, regarding relevant designations and related matters.
London Borough of Ealing	Development Strategy 2026 Development Plan Document, 2012 and Development Management Development Plan Document, 2013, regarding relevant designations and related matters.
Royal Borough of Windsor and Maidenhead Council	The Royal Borough of Windsor and Maidenhead Local Plan, 2003, regarding relevant designations and related matters.
Runnymede Borough Council	Runnymede Borough Local Plan, 2001, regarding relevant designations and related matters.
Slough Borough Council	Slough Local Development Framework Core Strategy 2006–2026, 2008 and Slough Local Plan, 2004, regarding relevant designations and related matters.
South Buckinghamshire District Council	South Buckinghamshire Local Plan, 1999 and South Buckinghamshire Core Strategy, 2011, regarding relevant designations and related matters.
London Borough of Richmond upon Thames	Local Development Framework Core Strategy, 2009 and Local Development Framework Development Management Plan, 2011, regarding relevant designations and related matters.



Source	Data
Spelthorne Borough Council	Core Strategy and Policies, 2009 and Spelthorne Borough Local Plan, 2001, regarding relevant designations and related matters.

Baseline surveys

- 13.5.5 Field surveys have been undertaken during 2017 in respect of landscape character, the identification of potential groups of visual receptors and representative viewpoints. These surveys have informed the description of baseline conditions in the following sections.

13.6 Baseline conditions

Landscape

- 13.6.1 The DCO Project falls within National Character Area (NCA) 115: Thames Valley⁷. Key characteristics of this character area, are as follows:

“Flat and low-lying land, rising to low, river-terraced hills, which include the prominent local outcrop of chalk on which Windsor Castle sits.

The underlying geology is dominated by the London Clay which, over much of the area, is overlain by river-lain sands and gravels.

The numerous hydrological features provide unity to an area which otherwise lacks homogeneity; these features include the River Thames and its tributaries, streams, lakes, canals and open waterbodies (the result of restored gravel workings).

Woodlands characterise the north-western area, with the wooded character extending up to the southern edge of the Chiltern Hills.

Farming is limited. Where it survives, grazed pasture is the major land use within a generally open, flat and featureless landscape. The field pattern is medium-scale and irregular, with smaller fields to the west. Localised areas of species-rich hay meadows provide a splash of colour in summer.

Although densely populated and developed, pockets of woodland, open grassland, parkland, wetlands and intimate meadows provide escape and tranquillity, and include a variety of habitats supporting important populations of many species, notably stag beetle, shoveler, gadwall and other invertebrates and wildfowl.

⁷ National Character Area profiles www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making/national-character-area-profiles (accessed 20 March 2018)



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Towards London in the east, the natural character of the area is overtaken by urban influences: a dense network of roads (including the M25 corridor), Heathrow Airport, railway lines, golf courses, pylon lines, reservoirs, extensive mineral extraction and numerous flooded gravel pits.

There are small but biologically important areas of lowland heathland – especially on higher sandy ground in the north – and a small area to the south falls within the Thames Basin Heaths Special Protection Area (SPA) buffer zone.

To the south, the open Thames flood plain dominates, with its associated flat grazing land, becoming characterised by a number of formal historic landscapes on higher ground. Between Hampton and Kew, the River Thames forms the focus of a series of designed landscapes.

The area has an urban character, and there are very few villages of more traditional character, although almost half of the area is greenbelt land and development has been restricted in areas like Crown Estate land and Eton College grounds.

The river is closely associated with numerous historic places and cultural events, such as the signing of Magna Carta at Runnymede. Tourists from all over the world are drawn to the rich heritage of the area, flocking to attractions like Hampton Court Palace and Windsor Castle.

The area is important for recreation, both for residents and visitors. Historic parkland and commons provide access to green space, the Thames Path National Trail runs the length of the NCA, and a variety of activities are enjoyed on the river and other waterbodies.”

13.6.2 In relation to tranquillity, NCA 115 is further described as follows:

“Based on the CPRE map of Tranquillity (2006) none of this NCA can be officially considered as tranquil. The lowest scores for tranquillity are around the urban areas and Heathrow Airport. Expanses of parkland such as Windsor Great Park score medium tranquillity...The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are ‘intruded on’ from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that almost the entire NCA is disturbed by visual and auditory intrusion.”

13.6.3 As identified in NCA 115, Heathrow, which includes transport infrastructure and buildings, is a noteworthy element within the wider Thames Valley landscape. Near Heathrow, the lowland landscape includes semi-rural characteristics of the Colne Valley and associated historic villages, together with suburban areas of Greater London further east. It is a landscape generally characterised by urban influences, including a busy major road and rail network, together with substantial areas of industrial, commercial and residential development. The more rural elements are fragmented and include riparian corridors and grazed common land,



such as Staines Moor, however urban features, including buildings and roads, generally feature in the backdrop to these areas. The following landscape character assessments provide information regarding local landscape character areas and these will be further referred to as the assessment progresses.

1. Colne Valley Landscape Character Assessment, Colne Valley Landscape Partnership (2017)
2. Hillingdon Landscape and Townscape Character Assessment, London Borough of Hillingdon Council (2012)
3. Landscape Character Assessment for the Royal Borough of Windsor and Maidenhead Landscape Character Assessment, Royal Borough of Windsor and Maidenhead Council (2004)
4. Royal Borough of Windsor and Maidenhead Townscape Assessment, Royal Borough of Windsor and Maidenhead Council (2010)
5. South Bucks District Landscape Character Assessment, Buckinghamshire County Council and South Bucks District Council (2011)
6. Surrey Landscape Character Assessment, Surrey County Council and Surrey Planning Officers Association (2015) (includes the Borough of Spelthorne and the Borough of Runnymede).

13.6.4 The land being considered for the DCO Project falls within areas where the value of landscapes and townscapes is expressed through planning policy. These include areas within the Green Belt, Colne Valley Regional Park, Harmondsworth Conservation Area and Longford Conservation Area. Within the study area valued landscapes and townscapes include land within the Green Belt, Colne Valley Regional Park, Conservation Areas, Registered Parks and Gardens, West Drayton Area of Special Character (within the London Borough of Hillingdon) and Areas of Landscape Importance (within the London Borough of Runnymede). These areas are shown on Figure 13.1. The local planning policies that are associated with these areas, and local assessments of landscape character, will be taken into account in the assessment, where relevant.

13.6.5 Within the study area local landscape/townscape character areas have varying susceptibility to change. A number of areas in the vicinity of Heathrow are influenced by detracting or discordant features, such as industrial land uses, which are not particularly susceptible to change and would benefit from landscape enhancement. Other areas, where infrastructure and development proposals would be less compatible with existing landscape/townscape characteristics, may be more susceptible to change.



Visual amenity

- 13.6.6 The preliminary ZTV relating to the DCO Project, which has been modelled for this Scoping Report, is illustrated on Figure 13.1. The more sensitive visual receptors within the ZTV include residential properties and recreational routes. Proposed representative viewpoints are indicated in Table 13.4, which are the more sensitive visual receptors at locations and have been selected from the range of geographical areas where visual receptors occur within the ZTV; a greater proportion of viewpoints fall within areas immediately surrounding the DCO Project than within areas more distant from the DCO Project. This includes areas of settlement immediately surrounding the DCO Project, including those at Harmondsworth, Sipson, West Drayton, Harlington, Hayes, Cranford Cross, Cranford, Heston, Hounslow, Feltham North, Bedfont, Stanwell, Stanwell Moor, Poyle, Colnbrook, Brands Hill, Richings Park and Iver. Proposed viewpoints have also been included from more distant areas within the ZTV, as identified in Table 13.4.
- 13.6.7 Proposed representative viewpoints are as set out in Table 13.4 for consultation as part of this scoping process. As noted above, these viewpoints will continue to be discussed with stakeholders.
- 13.6.8 Sequential views will be considered through the inclusion of multiple viewpoints on or near a given linear route, such as the Colne Valley Trail/Way, where relevant. Proposed locations for such sequential representative viewpoints are also included within Table 13.4.

Table 13.4 Representative viewpoints

Viewpoint number	Description and orientation	Grid reference		Designations at/near viewpoint	Principal visual receptor groups represented
1	High Street, Harmondsworth, looking south	505899	177784	Harmondsworth Conservation Area; Green Belt; Colne Valley Regional Park	Residential properties and users of Public Rights of Way (PRoW) and roads at/near Harmondsworth
2	Public Footpath at The Closes, West Drayton, looking south	505989	179118	West Drayton Conservation Area; West Drayton Area of Special Local Character	Residential properties and users of PRoW and roads at/near West Drayton
3	Sipson Road at Holiday Inn Hotel, near Sipson, looking south-west	507115	178349	Green Belt	Residential properties and users of PRoW and roads at/near Sipson and Hayes

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Viewpoint number	Description and orientation	Grid reference		Designations at/near viewpoint	Principal visual receptor groups represented
4	Stockley Country Park, looking south-west	507439	180845	Stockley Country Park and other Country Parks nearby; Green Belt	Visitors to Stockley Park; residential properties and users of PRow (including London Loop) and roads at/near Stockley Park
5	Victoria Lane, Harlington, looking west	508531	178016	Green Belt; Harlington Conservation Area	Residential properties and users of PRow and roads at/near Harlington
6	Cranford Park, looking south-west	510085	178057	Cranford Conservation Area and other Conservation Areas nearby; Cranford Country Park and other Country Parks nearby; Green Belt	Visitors to Cranford Countryside Park; residential properties and users of PRow (including the London Loop) and roads at/near Cranford Cross, Cranford and Heston
7	Hounslow Heath, looking north-west	511713	174269	Green Belt and Conservation Areas near Hounslow Heath	Visitors to Hounslow Heath; residential properties and users of PRow (including the London Loop) and roads in the nearby areas of Hounslow and Feltham North
8	West View, East Bedfont, looking north-west	508064	173500	Bedfont Green Conservation Area	Residential properties and users of PRow and roads at/near the western edge of East Bedfont
9	Bedfont Lakes Country Park, looking north-west	508441	172855	Bedfont Lakes Country Park; Green Belt	Visitors to Bedfont Lakes Country Park; residential properties and users of PRow and roads in the Bedfont locality
10	Oaks Road, Stanwell, looking north-west	505759	174496	Stanwell Conservation Area; Green Belt; Colne Valley Regional Park	Residential properties and users of PRow and roads at/near Stanwell

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Viewpoint number	Description and orientation	Grid reference		Designations at/near viewpoint	Principal visual receptor groups represented
11	Horton Road, Stanwell Moor, looking north-east	504295	174658	Green Belt; Colne Valley Regional Park	Residential properties and users of PRoW and roads at/near Stanwell Moor
12	Shortwood Common, Looking north	505082	171773	Green Belt; Colne Valley Regional Park	Users of Countryside and Rights of Way Act Open Access Land; residential properties and users of PRoW and roads at/near Shortwood Common
13	Colne Valley Way, Staines Moor, looking north-east	503188	172692	Green Belt; Colne Valley Regional Park	Users of Colne Valley Way and Countryside and Rights of Way Act Open Access Land
14	Air Forces Memorial, Cooper's Hill, looking north-east	499846	171972	Green Belt; Colne Valley Regional Park; Runnymede Area of Landscape Importance	Residential properties and users of PRoW, Countryside and Rights of Way Act Open Access Land, cycle routes (including National Cycle Route 4) and roads at/near Coopers Hill
15	Tanhouse Way Public Footpath, Colnbrook, looking north-east	502939	177305	Colnbrook Conservation Area; Green Belt; Colne Valley Regional Park	Residential properties, users of PRoW (including Colne Valley Trail), recreational space and roads at/near Colnbrook and Poyle
16	Colne Valley Way near Horton, looking north-east	501856	176171	Green Belt; Colne Valley Regional Park	Residential properties and users of PRoW (including Colne Valley Way) and roads at/near Horton
17	Albert Bridge, Windsor, looking north-east	498472	175660	Green Belt, The Home Park Registered Park and Garden and other Registered Parks and Gardens nearby	Residential properties and users of PRoW (including Thames Path) and roads at/near Old Windsor and Datchet

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Viewpoint number	Description and orientation	Grid reference		Designations at/near viewpoint	Principal visual receptor groups represented
18	Public Bridleway at Old Wood, looking south-east	503239	178094	Green Belt; Colne Valley Regional Park	Residential properties and users of PRow (including Colne Valley Trail) and roads at/near Brands Hill and Richings Park
19	Market Lane, Slough, looking south-east	502099	179577	Green Belt; Colne Valley Regional Park	Residential properties and users of PRow (including Grand Union Canal Walk) and roads at/near the eastern edge of Slough
20	George Green Drive, Langley Park, looking south-east	500684	181360	Langley Park Registered Park and Garden; Langley Park Country Park; Green Belt; Colne Valley Regional Park	Visitors to Langley Park; residential properties and users of PRow (including Colne Valley Trail), cycle routes (including National Cycle Route 61) and roads at/near George Green, Shreding Green, Love Green and Iver Heath
21	Harmondsworth Moor, looking south-east	504986	177862	Green Belt; Colne Valley Regional Park	Users of publicly accessible green space, PRow and roads at/near Harmondsworth Moor
22	Colne Valley Trail, Thorney Country Park, looking south-east	504520	179305	Thorney Country Park; Green Belt; Colne Valley Regional Park	Users of Colne Valley Trail; visitors to Thorney Country Park; residential properties and users of PRow and roads at Thorney and Richings Park
23	Beeches Way, near Iver, looking south-east	503832	182009	Colne Valley Regional Park; Green Belt; Iver Conservation Area and other Conservation Areas nearby	Residential properties and users of PRow (including Beeches Way and Colne Valley Trail), cycle routes (including National Cycle Route 61) and roads at/near Iver



Viewpoint number	Description and orientation	Grid reference		Designations at/near viewpoint	Principal visual receptor groups represented
24	Colne Valley Trail and National Cycle Route 61, Palmer's Moor Lane, near Uxbridge, looking north	504404	182205	Colne Valley Regional Park; Green Belt; Conservation Areas nearby	Residential properties and users of PRoW (including Colne Valley Trail), cycle routes (including National Cycle Route 61) and roads at/near Uxbridge
25	Public Footpath off Newtown Road, New Denham, looking south	504779	184836	Colne Valley Regional Park; Green Belt; Conservation Areas nearby	Residential properties, users of PRoW and roads at/near New Denham and Uxbridge

13.6.9 Relevant viewpoints will be considered both during the day and at night-time to take account of lighting. The Guidance Notes for the Reduction of Obtrusive Light, Institution of Lighting Professionals (2011) identifies Environmental Zones that define the broad night-time characteristics of areas in terms of relative brightness or darkness, which has a bearing on night-time visual amenity. Environmental Zones classified in the Institution of Lighting Professionals (ILP) guidance are as follows:

1. E0: dark landscapes such as United Nations Educational Scientific and Cultural Organisation (UNESCO) Starlight Reserves or International Dark Sky Association (IDA) Dark Sky Parks
2. E1: intrinsically dark landscapes, for example, National Parks, Areas of Outstanding Natural Beauty
3. E2: low district brightness areas, for example, rural, small village or relatively dark urban locations
4. E3: medium district brightness areas, for example, small town centres or urban locations
5. E4: high district brightness areas, for example, town/city centres with high levels of night-time activity.

13.6.10 Land within the Airport is considered to fall within an E4 Environmental Zone and land surrounding the Airport is considered to fall predominantly within an E3 Environmental Zone, with some areas of land considered to fall within an E2 Environmental Zone. These Environmental Zones define the broad night-time context of the DCO Project.



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13.7 Likely significant effects requiring assessment

- 13.7.1 The likely significant effects considered to require assessment through the EIA process for the DCO Project are set out in Table 13.5. Cumulative landscape and visual amenity effects resulting from the combination of effects from the Scheme and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

Table 13.5 Likely significant landscape and visual effects requiring assessment

Activity	Effect	Receptor
Construction		
Construction activities associated with the DCO Project, including the creation of worker offices, movement of plant and vehicles and material stockpiling together with creation of compounds and construction components therein.	These construction activities have the potential to adversely affect landscape/townscape character together with visual amenity.	Local landscape/townscape and the visual receptors identified in Section 13.6, including residential properties and recreational routes.
Operation		
Operation (both the built form and the operational activities) relating to the Airport, roads, airport supporting facilities and airport related development. Operational components include the runway, taxiways, terminals, aprons, roads (including M25 proposals), river diversions and flood storage, together with airport supporting facilities and airport related development.	These infrastructure and development proposals have the potential to adversely affect landscape/townscape character together with visual amenity.	Local landscape/townscape and the visual receptors identified in Section 13.6, including residential properties and recreational routes.



13.8 Effects not requiring assessment

- 13.8.1 The DCO Project and study area do not lie in a marine or coastal location; therefore, it is anticipated that an assessment of seascape effects, including cumulative effects, would not be required, as summarised in Table 13.6.

Table 13.6 Potential effects to be scoped out of the landscape and visual amenity assessment

Activity	Effect	Receptor	Justification for scoping out
Activities described in Table 13.5	Adverse seascape effects, including cumulative effects	Seascape	The DCO Project and study area do not lie in a marine or coastal location

13.9 Proposed approach to the assessment

Additional baseline information required

- 13.9.1 As described in Section 13.4, should the study area change in response to consultation and the evolving design, baseline data for landscape and visual amenity will be reviewed and updated accordingly. Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.
- 13.9.2 As the consultation process progresses and the DCO Project is refined, baseline information (including identification of relevant designations, landscape character areas and viewpoint locations) will also continue to evolve in response to these considerations. Further surveys will be undertaken, during winter and summer, to describe visual receptor groups and representative views. Consideration of night-time visual amenity will be supported by a lighting assessment, which will include information regarding relevant Environmental Zones.

Assessment years

- 13.9.3 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the landscape and visual amenity assessment specifically.
- 13.9.4 Landscape and visual amenity effects will be assessed during construction, during operation in the year of opening and during operation 15 years after opening, as is consistent with the Landscape and Visual Effects Assessment guidance (IAN 135/10) set out below.



Construction and operation assessment methodology

- 13.9.5 The approach to the assessment of construction effects is as for the approach to the assessment of operation effects, i.e. in accordance with the guidance identified in Sections 13.9.6 – 13.9.9.
- 13.9.6 The DCO Project encompasses a range of development and infrastructure proposals, including highway proposals, as set out in **Chapter 3: The DCO Project**. The LVIA for the DCO Project will be informed principally by the following good practice guidance:
1. Guidelines for Landscape and Visual Impact Assessment: Third Edition (GLVIA3), Landscape Institute (LI) and Institute of Environmental Management and Assessment (IEMA) (2013)
 2. Interim Advice Note 135/10: Landscape and Visual Effects Assessment (IAN 135/10), Highways Agency (now Highways England) (2010)
 3. HA 205/08: Assessment and Management of Environmental Effects (HA 205/08), Highways Agency (now Highways England) (2008)
 4. Advice Note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment (LI Advice Note 01/11), Landscape Institute (2011)
 5. Guidance Notes for the Reduction of Obtrusive Light (GN01:2011), Institution of Lighting Professionals (2011).
- 13.9.7 GLVIA3 does not set out specific significance criteria, rather the guidance advocates use of clear methods by which reasoned professional judgments should be applied. The principle of setting out reasoned, professional judgement will be adopted through the EIA process. However, to aid consistency in assessing landscape and visual effects across the DCO Project, the significance criteria set out in IAN 135/10 will be used as guidance, as set out in Table 13.7 to Table 13.10.

Table 13.7 Determining sensitivity

Sensitivity	Criteria
High	<p><u>Landscape:</u> Landscapes which by nature of their character would be unable to accommodate change of the type proposed. Typically these would be:</p> <ol style="list-style-type: none"> a) of high quality with distinctive elements and features making a positive contribution to character and sense of place b) likely to be designated but the aspects which underpin such value may also be present outside designated areas, especially at the local scale



Sensitivity	Criteria
	<p>c) areas of special recognised value through use, perception or historic and cultural associations</p> <p>d) likely to contain features and elements that are rare and could not be replaced.</p> <p><u>Visual Amenity:</u></p> <p>a) residential properties</p> <p>b) users of Public Rights of Way ("PRoW") or other recreational trails (for example, National Trails, footpaths, bridleways, etc.)</p> <p>c) users of recreational facilities where the purpose of that recreation is enjoyment of the countryside (for example, Country Parks, National Trust or other access land).</p>
Moderate	<p><u>Landscape:</u></p> <p>Landscapes which by nature of their character would be able to partly accommodate change of the type proposed. Typically these would be:</p> <p>a) comprised of commonplace elements and features creating generally unremarkable character, but with some sense of place</p> <p>b) locally designated, or their value may be expressed through non-statutory local publications</p> <p>c) containing some features of value through use, perception or historic and cultural associations</p> <p>d) likely to contain some features and elements that could not be replaced.</p> <p><u>Visual Amenity:</u></p> <p>a) outdoor workers;</p> <p>b) users of scenic roads, railways or waterways or users of designated tourist routes</p> <p>c) schools and other institutional buildings and their outdoor areas.</p>
Low	<p><u>Landscape:</u></p> <p>Landscapes which by nature of their character would be able to accommodate change of the type proposed. Typically these would be:</p> <p>a) comprised of some features and elements that are discordant, derelict or in decline, resulting in indistinct character with little or no sense of place</p> <p>b) not designated</p> <p>c) containing few, if any, features of value through use, perception or historic and cultural associations</p> <p>d) likely to contain few, if any, features and elements that could not be replaced.</p> <p><u>Visual Amenity:</u></p> <p>a) indoor workers</p> <p>b) users of main roads (for example, trunk roads) or passengers in public transport on main arterial routes</p> <p>c) users of recreational facilities where the purpose of that recreation is not related to the view (for example, sports facilities).</p>

Source: IAN 135/10

13.9.8 The magnitude of impact will be assessed as shown in Table 13.8.



Table 13.8 Determining magnitude of impact

Magnitude of impact	Criteria
Major	<p><u>Landscape:</u> Adverse - Total loss or large-scale damage to existing character or distinctive features and elements and/or the addition of new but uncharacteristic conspicuous features and elements; or Beneficial - Large scale improvement of character by the restoration of features and elements and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive features.</p> <p><u>Visual Amenity:</u> Adverse / Beneficial - The project, or a part of it, would become the dominant feature or focal point of the view.</p>
Moderate	<p><u>Landscape:</u> Adverse - Partial loss or noticeable damage to existing character or distinctive features and elements and/or the addition of new but uncharacteristic noticeable features and elements; or Beneficial - Partial or noticeable improvement of character by the restoration of existing features and elements and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.</p> <p><u>Visual:</u> Adverse / Beneficial - The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.</p>
Minor	<p><u>Landscape:</u> Adverse - Slight loss or damage to existing character or features and elements and/or the addition of new but uncharacteristic features and elements; or Beneficial - Slight improvement of character by the restoration of existing features and elements and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.</p> <p><u>Visual Amenity:</u> Adverse / Beneficial - The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.</p>
Negligible	<p><u>Landscape:</u> Adverse - Barely noticeable loss or damage to existing character or features and elements and/or the addition of new but uncharacteristic features and elements; or Beneficial - Barely noticeable improvement of character by the restoration of existing features and elements and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements.</p> <p><u>Visual Amenity:</u> Adverse / Beneficial - Only a very small part of the project would be discernible, or it is at such a distance that it would form a barely noticeable feature or element of the view.</p>
No Change	<p><u>Landscape:</u> No noticeable loss, damage or alteration to character or features or elements.</p> <p><u>Visual Amenity:</u> No part of the project, or work or activity associated with it, is discernible.</p>

Source: IAN 135/10



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13.9.9 The significance of effect will be determined using the framework set out in Table 13.9 as a guide. Where more than one significance outcome is possible, professional judgment will be applied to determine which is the most appropriate classification, on a case by case basis. This will apply a precautionary approach, whereby caution will be exercised in order that professional judgement is inclined towards concluding the worst outcome in the event of uncertainty regarding selection from more than one possible outcome. Only ‘Large’ or ‘Very Large’ effects will be considered likely significant effects for the purposes of the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017, as is consistent with HA 205/08.

Table 13.9 Determination of significant effects for landscape and visual amenity

Magnitude:		No change	Negligible	Minor	Moderate	Major
Sensitivity:						
High	Neutral	Slight	Slight/ Moderate	Moderate/ Large	Large/ Very Large	
Moderate	Neutral	Neutral/ Slight	Slight	Moderate	Moderate/ Large	
Low	Neutral	Neutral/ Slight	Neutral/ Slight	Slight	Slight/ Moderate	

Source: IAN 135/10. **Bold text** identifies likely significant effects

13.9.10 Typical descriptors of each effect category are provided in Table 13.10.

Table 13.10 Assessing significance of effect

Significance of effect	Criteria
Very Large	<p><u>Landscape:</u> Beneficial - The project would: a) greatly enhance the character (including quality and value) of the landscape; b) create an iconic high quality feature and/or series of elements; and c) enable a sense of place to be created or greatly enhanced. Adverse - The project would: a) be at complete variance with the character (including quality and value) of the landscape; b) cause the integrity of characteristic features and elements to be lost; and c) cause a sense of place to be lost.</p> <p><u>Visual Amenity:</u> Beneficial - The project would create an iconic new feature that would greatly enhance the view; and Adverse - The project would cause the loss of views from a highly sensitive receptor and would constitute a dominant discordant feature in the view.</p>



Significance of effect	Criteria
Large	<p><u>Landscape:</u> Beneficial - The project would: a) enhance the character (including quality and value) of the landscape; b) enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development; and c) enable a sense of place to be enhanced.</p> <p>Adverse - The project would: a) be at considerable variance with the character (including quality and value) of the landscape; b) degrade or diminish the integrity of a range of characteristic features and elements; and c) damage a sense of place.</p> <p><u>Visual Amenity:</u> Beneficial - The project would lead to a major improvement in a view from a highly sensitive receptor; or Adverse - The project would cause major deterioration to a view from a highly sensitive receptor and would constitute a major discordant element in the view.</p>
Moderate	<p><u>Landscape:</u> Beneficial - The project would: a) improve the character (including quality and value) of the landscape; b) enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development; and c) enable a sense of place to be restored.</p> <p>Adverse - The project would: a) conflict with the character (including quality and value) of the landscape; b) have an adverse impact on characteristic features or elements; and c) diminish a sense of place.</p> <p><u>Visual Amenity:</u> Beneficial - The project would cause obvious improvement to a view from a moderately sensitive receptor or, perceptible improvement to a view from a more sensitive receptor; or Adverse - The project would cause obvious deterioration to a view from a moderately sensitive receptor or, perceptible damage to a view from a more sensitive receptor.</p>
Slight	<p><u>Landscape:</u> Beneficial - The project would: a) complement the character (including quality and value) of the landscape; and b) maintain or enhance characteristic features and elements; and c) enable some sense of place to be restored.</p> <p>Adverse - The project would: a) not quite fit the character (including quality and value) of the landscape; b) be at variance with characteristic features and elements; and c) detract from a sense of place.</p> <p><u>Visual Amenity:</u></p>



Significance of effect	Criteria
	<p>Beneficial - The project would cause limited improvement to a view from a receptor of medium sensitivity or, would cause greater improvement to a view from a receptor of low sensitivity; or</p> <p>Adverse - The project would cause limited deterioration to a view from a receptor of medium sensitivity or, cause greater deterioration to a view from a receptor of low sensitivity.</p>
Neutral	<p><u>Landscape:</u> The project would:</p> <ul style="list-style-type: none"> a) maintain the character (including quality and value) of the landscape; b) blend in with characteristic features and elements; and c) enable a sense of place to be retained. <p><u>Visual Amenity:</u> No perceptible change in the view.</p>

Source: IAN 135/10

13.10 Approach to mitigation

Construction phase

- 13.10.1 A Code of Construction Practice (CoCP) will be produced, setting out the proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, management and control during construction, to mitigate likely effects, including landscape and visual amenity effects. Landscape and visual amenity considerations will also inform the development process for construction methods and components, such as those relating to temporary earthworks, hoarding and other elements.

Operation phase

- 13.10.2 The iterative design development process will carefully consider and respond to the landscape character and visual amenity context of proposed options, to avoid or minimise adverse landscape and visual consequences of development and, where possible, provide enhancement. Design measures will be formulated through interface of the design and EIA processes in order to produce the intended mitigatory result. Such design measures will form embedded mitigation and will include use of materials, lighting elements and landscape proposals that are appropriate in terms of landscape character and visual amenity. In particular, landscape and visual considerations will inform the green infrastructure strategy for the DCO Project outlined in **Chapter 3: The DCO Project**.



Chapter 14

Land quality



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14. LAND QUALITY

14.1 Introduction

- 14.1.1 This chapter describes the scope of the assessment as it relates to land quality, agricultural land quality (which includes soils and geodiversity) and mineral safeguarding. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 14.1.2 This chapter describes:
1. The topic specific policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. The study area for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the DCO Project on land quality, agricultural land quality and mineral safeguarding
 7. Effects not requiring assessment
 8. Proposed approach to the assessment
 9. Approach to mitigation.
- 14.1.3 The scope of the land quality assessment in respect of groundwater and surface water is limited to water quality. Effects on water quantity (such as groundwater base flow to rivers or groundwater levels) are covered in **Chapter 18: Water environment**.
- 14.1.4 In addition, potential effects on ecological receptors are included in **Chapter 6: Biodiversity** and contamination resulting from a major accident or disaster is covered in **Chapter 15: Major accidents and disasters**.
- 14.1.5 The scope of agricultural land quality assessment covered in this chapter relates to the quality of farmland, soils and geodiversity. The socio-economic aspects of agriculture (i.e. effects on farming businesses) are covered in **Chapter 10: Employment and economics**.
- 14.1.6 The scope of the minerals safeguarding assessment covered in this chapter is limited to the safeguarding of mineral resources ‘in the ground’ and the non-



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physical effects of extraction of these *in-situ* primary aggregate mineral resources for use within the DCO Project.

- 14.1.7 Mineral safeguarding policy is interpreted as only applying to the sand and gravel resource because this is the only ‘aggregate mineral’ in the geological sequence.
- 14.1.8 The potential effects associated with the physical extraction of minerals (e.g. dust, noise etc) are considered within the individual chapters, **Chapter 5: Air quality and odour** and **Chapter 16: Noise and vibration**.

14.2 Policy and legislation

- 14.2.1 This section identifies the key policies and legislation which have informed the scope of the assessment presented in this **Chapter 14: Land quality**. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.
- 14.2.2 The key legislation and policies relevant to the scope of the land quality, agricultural land quality and mineral safeguarding assessments are detailed in Table 14.1.

Table 14.1 Key policy and legislation relevant to land quality, agricultural land quality and mineral resources assessment

Relevant policy / legislation	Relevance to the assessment
Policy - UK	
Revised Draft Airports National Policy Statement (ANPS 2017) ¹	<p>Once designated, the ANPS will provide the principal planning policy to be applied to the DCO Project.</p> <p>The revised draft ANPS advises that where the development is subject to an EIA, the applicant should undertake an assessment of any likely significant land quality (including land instability), agricultural land quality and minerals safeguarding effects and describe them in the Environmental Statement (ES).</p> <p>The revised draft ANPS advises that the applicant should document whether the scheme has been designed to avoid or minimise adverse effects in relation to land quality (Paragraphs 4.54 and 5.114) and land instability (Paragraphs 5.225 to 5.227) and, where necessary, identify how land contamination and land instability is proposed to be addressed. It further states that where pre-existing land contamination is being considered through development, the objective is to ensure that the site is suitable for its intended use. Risks would</p>

¹ Department of Transport Revised Draft Airports National Policy Statement: new runway capacity and infrastructure at airports in the South East of England, October 2017



Relevant policy / legislation	Relevance to the assessment
	<p>require consideration in accordance with the contaminated land statutory guidance as a minimum.</p> <p>Paragraphs 5.107, 5.114 and 5.124 advise that the applicant should take into account the economic and other benefits of best and most versatile agricultural land, and where significant development of agricultural land is demonstrated to be necessary, seek to use areas of poorer quality land in preference to that of a higher quality. It further states that the applicant should demonstrate how impacts on soil resources will be minimised.</p> <p>Paragraphs 5.119 and 5.120 advise that applicant should put forward appropriate mitigation measures to safeguard mineral resources and consider prior extraction of any remaining mineral resource.</p>
<p>National Policy Statement for National Networks (NN NPS) (Department for Transport 2014)</p>	<p>Section 5 (paragraphs 168 and 176) advises that applicants should take into account the economic and other benefits of the best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification (ALC)). Where significant development of agricultural land is demonstrated to be necessary, applicants should seek to use areas of poorer quality land in preference to that of a higher quality. Applicants should also identify any effects, and seek to minimise impacts, on soil quality, taking into account any mitigation measures proposed. Where possible, developments should be on previously developed (brownfield) sites provided that it is not of high environmental value.</p> <p>For developments on previously developed land, Paragraph 168 advises applicants should ensure that they have considered the risk posed by land contamination and how it is proposed to address this (referencing Environment Agency Guidance CLR11²).</p> <p>The decision-making process should take into account the economic and other benefits of the best and most versatile agricultural land. Little weight should be given to the loss of agricultural land in grades 3b, 4 and 5, except in areas (such as uplands) where particular agricultural practices may themselves contribute to the quality and character of the environment or the local economy.</p> <p>Section 5 (paragraph 169) advises that applicants should safeguard any mineral resources on the proposed site as far as possible.</p> <p>Paragraph 182 advises that appropriate mitigation measures should be put forward to safeguard mineral resources where a development impacts on a Mineral Safeguarding Area (MSA).</p>

² Environment Agency, Model Procedures for the Management of Land Contamination, Contaminated Land Report 11 (CLR11), 2004



Relevant policy / legislation	Relevance to the assessment
National Planning Policy Framework (NPPF 2012)³	<p>Section 11 (paragraphs 120 and 121) outlines the requirement for managing and mitigating contamination and land instability risks associated with future site uses through the planning system in a manner that is compliant with UK legislation and guidance including Part 2A of the Environmental Protection Act 1990.</p> <p>Section 11 (paragraphs 109 and 112) sets out requirements to protect Best and Most Versatile (BMV) agricultural land (land in Grade 1, 2 and 3a of the ALC), geological conservation interests (i.e. geodiversity sites) and soils and prevent unacceptable levels of land and soil pollution and land instability.</p> <p>Section 13 (paragraphs 142 to 145) outline the requirement for mineral safeguarding and extraction through the planning system.</p> <p>A draft revised NPPF⁴ is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard</p>
Safeguarding our Soils: A Strategy for England (DEFRA, 2009)⁵	<p>Policy setting out strategy for the protection, enhancement and restoration of soils.</p>
Legislation	
Part 2A of the Environmental Protection Act 1990 (Part 2A) including DEFRA's Part 2A Contaminated Land Statutory Guidance	<p>The Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes. Part 2A of the Act provides the regulatory basis for the identification, designation and remediation of Contaminated Land.</p>
The Environmental Permitting (England and Wales) Regulations 2016 transposing into domestic law the EU Landfill Directive (1999/31/EC (LFD)).	<p>Regulations to manage and reduce pollution from certain industrial activities through permitting, monitor compliance with permit conditions and promote environmental standard practice in operation of the activities covered by a permit. Of relevance to the assessment is the permitting of landfills and waste management facilities.</p>
The Water Environment (Water	<p>The aim of the WFD is for all water bodies to achieve Good Status by 2027 (comprised of scores for Ecological Status and Chemical Status) and to ensure</p>

³ Department for Communities and Local Government, National Planning Policy Framework, 2012

⁴ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018

⁵ Department for Environment, Food and Rural Affairs (DEFRA), Safeguarding our Soils: A Strategy for England, 2009



Relevant policy / legislation	Relevance to the assessment
Framework Directive) (England and Wales) Regulations 2017 transposing into domestic law The EU Water Framework Directive (2000/60/EC) (WFD)	no deterioration from current status. Water quality is assessed within Appendix 18.1 WFD methodology .
Water Resources Act (1991) as amended by the Water Act (2003)	The Acts provide the definition of and regulatory controls for the protection of water resources including the quality standards expected for controlled waters.
Environment Act 1995	The Act established the Environment Agency and gave it responsibility for environmental protection of controlled waters.

- 14.2.3 Due regard will also be given to local policies and the Government's 25 year Environment Plan⁶ where relevant.

14.3 Stakeholder engagement

- 14.3.1 In preparing this Scoping Report, meetings have been held with a number of stakeholders to discuss the approach to the assessment as well as to obtain baseline environmental information and to identify any likely significant effects. A summary of the consultations undertaken to date for this purpose are presented in Table 14.2.
- 14.3.2 In advance of the statutory consultation required under the Planning Act 2008, further (non-statutory) engagement is planned. This will include a series of meetings to discuss the emerging baseline information, likely significant effects and emerging mitigation proposals in the context of the DCO Project. Details of this proposed future engagement for this purpose are also presented in Table 14.2.

⁶ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment, 2018



Table 14.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Environment Agency	<p>Meetings with contaminated land, hydrogeology and permitting technical staff covering the following topics:</p> <ol style="list-style-type: none"> 1. Introduction to land quality topic and landfills 2. Review of baseline data available and proposed to be collected 3. Proposed earthworks strategy 4. Landfill permitting 5. Construction quality assurance (CQA) 6. Ground investigation surveys 7. Potential land quality controlled waters effects. <p>Discussion and comments on draft copy of the land quality “<i>Approach to Human Health and Controlled Waters Risk Assessment</i>” which provided broad agreement with the approach being taken (see paragraph 14.9.36).</p>	<p>Meetings with technical and wider staff to discuss:</p> <ol style="list-style-type: none"> 1. Emerging baseline information 2. Landfill permitting 3. Potential land quality controlled waters effects 4. Emerging mitigation strategies for land quality (controlled waters aspects) 5. Draft Code of Construction Practice (CoCP) requirements 6. Proposed earthworks strategy.
Heathrow Strategic Planning Group⁷ (HSPG)	<p>Meetings with contaminated land and planning officers covering following topics:</p> <ol style="list-style-type: none"> 1. Introduction to land quality topic and landfills 2. Review of baseline data available and proposed to be collected 3. Proposed earthworks strategy 4. Ground investigation surveys 5. Potential land quality human health effects. <p>Discussion and comments on draft copy of the land quality “<i>Approach to Human Health and Controlled Waters Risk Assessment</i>” which provided broad agreement with the</p>	<p>Meetings with technical and wider staff to discuss:</p> <ol style="list-style-type: none"> 1. Emerging baseline information 2. Potential land quality human health effects 3. Emerging mitigation strategies for land quality (human health aspects), agricultural land quality and minerals safeguarding 4. Draft CoCP requirements 5. Proposed earthworks strategy.

⁷ For further information on the HSPG refer to Section 4.9: Engagement.



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>approach being taken (see paragraph 14.9.36).</p> <p>Discussion and comments on potential effects to be scoped out of the agricultural land quality and minerals safeguarding assessments (see paragraph 14.8.3 and 14.8.5).</p>	
Natural England	<p>Meeting with technical officers covering following topics:</p> <ol style="list-style-type: none"> 6. Overview of scope of land quality topic 7. Proposed approach to agricultural land quality baseline data collection and assessment. <p>Discussion and comments on potential effects to be scoped out of the agricultural land quality and minerals safeguarding assessments (see paragraphs 14.8.3 and 14.8.5).</p>	<p>Meetings with technical staff to discuss:</p> <ol style="list-style-type: none"> 1. Emerging baseline information 2. Emerging mitigation strategy for agricultural land quality.
Highways England	-	Discussion with technical staff to ensure proposed assessment methodologies are in line with Design Manual for Roads and Bridges (DMRB) ⁸ requirements.

Notes: Engagement to date based on meetings and discussions held prior to 30 April 2018.

14.4 Study areas

14.4.1 This section sets out the study areas for the land quality, agricultural land quality and minerals safeguarding assessments.

Land quality

14.4.2 The study area for the land quality assessment comprises all of the land being considered for the DCO Project and a 500m buffer area extending outwards.

⁸ Highways Agency, Design Manual for Roads and Bridges: Volume 11 Environmental Impact Assessment, 2009



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- 14.4.3 The rationale for the study area is informed by professional judgement when considering:
1. The spatial extent (taking into account contaminant degradation, dilution and dispersion in the environment) at which significant land quality effects are likely to have the potential to be realised through potentially active contaminant linkages
 2. The spatial extent from which off-site sources of contamination are likely to have the potential to present significant effects on receptors within the DCO Project
 3. The spatial extent from which geohazards such as compressible and collapsible ground and ground gases are likely to have the potential to present significant effects on receptors within the DCO Project.
- 14.4.4 Based on the current extent of the land being considered for the DCO Project (refer to Figure 3.1), the corresponding land quality study area is referred to on Figure 14.1.

Agricultural land quality

- 14.4.5 For agricultural land quality, the study area encompasses all of the land being considered for the DCO Project.
- 14.4.6 The rationale for the study area is that agricultural land quality (including soils and geodiversity) is geographically discrete and not substantially influenced by changes to the surroundings. That is to say, agricultural land quality and geodiversity will only be significantly affected by changes or activities (temporary or permanent) taking place on or at the resource itself, and therefore no buffer around the land being considered for the DCO Project is needed.
- 14.4.7 Based on the current extent of the land being considered for the DCO Project (refer to Figure 3.1), the corresponding agricultural land quality study area is referred to on Figure 14.1.

Minerals safeguarding

- 14.4.8 The study area for the minerals safeguarding assessment encompasses all of the land being considered for the DCO Project.
- 14.4.9 The rationale for the study area is based on the spatial extent of the DCO Project under which mineral resources have the potential to be directly or indirectly affected through mineral sterilisation or extraction.



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- 14.4.10 Based on the current extent of the land being considered for the DCO Project (refer to Figure 3.1), the corresponding minerals safeguarding study area is referred to on Figure 14.1.

14.5 Sources of data used for scoping

Baseline data collection

- 14.5.1 Baseline data collection is ongoing to obtain information that encompasses the whole of the study areas described in Section 14.4: Study areas. The baseline conditions presented in Section 14.6: Baseline conditions represent a review of the currently available data from the study area.
- 14.5.2 The data collected to date has predominantly been focused on the area immediately to the north and west of Heathrow. Details of future data collection are outlined in paragraph 14.10.4.

Desk study

- 14.5.3 The sources of data used in the preparation of this Scoping Report are summarised in Table 14.3.

Table 14.3 Data sources

Source	Data
gov.uk open data	Rivers shapefile Source Protection Zones (SPZs) Historic and Authorised landfills shapefiles Environmental Pollution incidents (database) Consented discharge data LiDAR topographic data Provisional ALC and post 1988 ALC data
Environment Agency	Groundwater level and quality data SPZs Historic and Authorised landfills data Groundwater vulnerability maps Pollution incident details
MAGIC website⁹	Designated sites Soilscape Aquifer designations and groundwater vulnerability Provisional ALC, post 1988 ALC and geological Sites of Special Scientific Interest (SSSIs) information.

⁹ MAGIC <http://www.magic.gov.uk/MagicMap.aspx> (accessed 30 January 2018)



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Source	Data
Ordnance Survey¹⁰	1:50,000 and 1:25,000 mapping
British Geological Survey (BGS)	On-line Geoindex 1:50,000 digital geology Borehole Record Viewer (offers access to the National Geoscience Data Centre collection of onshore scanned boreholes, shafts and well records)
Heathrow Airport Limited	Historic site investigation reports for Heathrow and surrounding developments/land parcels Operational site activities information Aerial drone photography
Slough Borough Council London Borough of Hounslow Spelthorne Borough Council South Bucks District Council Buckinghamshire County Council	Contaminated land register data Landfills data
Operators/Permit Holders of Authorised Landfills (Grundons, SITA Ltd, BA Ltd)	Landfill and environmental permit data
Landmark Information Group	1:10,000 and 1:50,000 historical mapping Historic and current aerial photography and mapping Environmental data (Envirocheck® Report)
Zetica Limited	Unexploded Ordnance (UXO) Desk Study Risk Assessment
National Soils Research Institute data¹¹	Soil descriptions and characteristics
Natural England	ALC Strategic Map information and data
London Geopartnership¹²	Information on geological SSSIs, Regionally Important Geological Sites (RIGS) and Local Important Geological Sites (LIGS) within London.
Buckinghamshire County Council London Borough of Haringey London Borough of Hillingdon London Borough of Hounslow Slough Borough Council South Bucks District Council Spelthorne Borough Council Surrey County Council The Royal Borough of Windsor and Maidenhead Council Greater London Authority	On-line planning portal data on existing and former mineral extraction sites Local mineral planning policies in existing and emerging development plans

¹⁰ Ordnance survey <https://www.ordnancesurvey.co.uk> (accessed 30 January 2018)

¹¹ Soilsmap map <http://www.landis.org.uk/soilsmap/> (accessed 30 January 2018)

¹² London Geodiversity Partnership <http://www.londongeopartnership.org.uk> (accessed 30 January 2018)



Source	Data
South East England Aggregates Working Party London Aggregates Working Party Greater London Authority London Borough of Hillingdon Buckinghamshire County Council Surrey County Council	South East Aggregates Monitoring Report 2014 & 2015, (South East England Aggregates Working Party), (SEEAWP 16/03) (September 2016) London Aggregated Monitoring Report 2014 & 2015 (LAWP 16/03) December 2016 Local Aggregates Assessment for London 2016 (December 2016) (Greater London Authority for the London Boroughs) 2013 Hillingdon Local Aggregates Assessment (June 2014) (Jacobs) Buckinghamshire County Council Local Aggregates Assessment 2015 (October 2016) Planning Service Surrey Local Aggregate Assessment 2016 (December 2016)

Baseline surveys

- 14.5.4 No baseline surveys have been carried out which inform scoping for the land quality, agricultural land quality and minerals safeguarding assessments.
- 14.5.5 The future baseline surveys which will be carried out as part of finalising the land quality, agricultural land quality and minerals safeguarding assessments (and submitted as part of the DCO application within the ES), are detailed in Section 14.10: Proposed approach to the assessment.

14.6 Baseline conditions

Geology

- 14.6.1 A large proportion (approximately 60%) of the land within the study area is underlain by landfilled materials, i.e. Artificial (Infilled) Ground. This Infilled Ground varies significantly in thickness and composition.
- 14.6.2 The superficial deposits vary across the study area (refer to Figure 14.2), including the following principal units:
1. Alluvium
 2. Langley Silt Member
 3. Pleistocene river terrace deposits.
- 14.6.3 The river terrace deposits form part of a wide expanse of superficial deposits across the floodplain of the River Thames and its tributaries. Consisting predominantly of sand and gravel, but with local lenses of silt, clay or peat, the sand and gravel deposits are generally permeable and range from 3m to 9m thick



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(average 5m). The thickness varies across the area both due to natural variation and to extensive past and current extraction.

- 14.6.4 The solid geological deposits (refer to Figure 14.3) comprise London Clay present from depths typically around 10m below ground level (m bgl), overlying at depth the Lambeth Group beds and Chalk Group. The thickness of the London Clay is highly variable with thicknesses up to 80m recorded on BGS logs from areas immediately surrounding Heathrow to thicknesses of up to 10m in the area west of Uxbridge.
- 14.6.5 The Lambeth Group is noted to be typically 20m thick in the study area but reduces in thickness towards the west. These deposits typically comprise interbedded clays, silty sands, thin limestones and gravels.
- 14.6.6 The Chalk deposits are encountered at depths in the region of 55m to 75m bgl in the areas immediately surrounding Heathrow, becoming shallower to the north of the study area, for example near Uxbridge where Chalk was encountered at 19m bgl. The upper part of the Chalk consists mainly of soft white chalk with flint nodules generally lying in distinct beds.

Hydrogeology

- 14.6.7 The superficial deposits are classed by the Environment Agency as a Principal Aquifer (river terrace deposits) and Secondary A Aquifer (Alluvium).
- 14.6.8 The London Clay is classified as unproductive strata. The Lambeth Group is classified as a Secondary A Aquifer and the Chalk is classed as a Principal Aquifer.
- 14.6.9 Groundwater is principally present within the river terrace deposits and the Lambeth Group/Chalk, with the London Clay (due to the significant thickness) acting as a low permeability barrier, making it extremely unlikely that contamination can migrate vertically between the aquifer units in the absence of a preferential pathway.
- 14.6.10 A more detailed review of the baseline information with regards to groundwater is included in **Chapter 18: Water environment**.

Hydrology

- 14.6.11 A number of major rivers are present within the study area, including the Duke of Northumberland's River, the River Colne, the Wraysbury River, the River Crane and the Longford River. In addition, numerous surface water ponds and streams, including the Horton Brook, Colne Brook and Poyle Channel are also present across the study area.



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- 14.6.12 A more detailed review of the baseline information with regards to surface waters (including a full list of the surface water receptors) is included in **Chapter 18: Water environment**.

Sensitive land uses

- 14.6.13 There are SSSI's, Special Protection Areas (SPA) and Ramsar sites in the study area including Staines Moor SSSI, Wraysbury Reservoir SSSI and South-West London Waterbodies SPA and Ramsar site.
- 14.6.14 In addition, the western section of the study area is located in the Colne Valley Regional Park and includes Harmondsworth Moor and Stanwell Moor.
- 14.6.15 A more detailed review of the baseline information with regards to ecological receptors and sensitive land uses is included in **Chapter 6: Biodiversity**, where potential effects on these receptors is also considered.

Soils

- 14.6.16 The Soilsmap Map¹³ indicates that the soils of the study area are generally classified as *“freely draining slightly acidic loamy soils”* and *“loamy and clayey floodplain soils with naturally high groundwater”* except in the east of the study area where they are classified as *“loamy soils with naturally high groundwater”*.

Agricultural land quality

- 14.6.17 The ALC system classifies land into five grades, with Grade 3 subdivided into Subgrades 3a and 3b. BMV agricultural land is defined as Grades 1, 2 and 3a.
- 14.6.18 The Provisional ALC mapping indicates the study area as being predominantly 'non-agricultural' and 'urban' land with some agricultural land classified as Grades 1, 2 and 3, refer to Figure 14.4.
- 14.6.19 The ALC Strategic Map, refer to Figure 14.5, indicates the majority of the study area is 'urban/industrial' or 'non-agricultural use'. In the areas of agricultural land, the predicted likelihood of BMV agricultural land occurring varies between high (more than 60% of an area being BMV) and low (less than 20% of an area being BMV).
- 14.6.20 These two datasets indicate that there is potential for BMV land being present. However, it is the site specific ALC field survey data carried out according to the Agricultural Land Classification of England and Wales: revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988¹⁴), known as Post

¹³ Soilsmap map <http://www.landis.org.uk/soilsmap/> (accessed 30 January 2018)

¹⁴ Ministry of Agriculture, fisheries and Food, Agricultural land classification of England and Wales; revised guidelines and criteria for grading the quality of agricultural land, 1988



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1988 ALC field surveys, that provides detailed information on ALC grades at the level required to identify the presence of BMV agricultural land.

- 14.6.21 Where post 1988 ALC field surveys have taken place within the study area (refer to Figure 14.6) the results show agricultural land being a mix of grades, with Grade 1, 2 and 3a (ALC grades used to classify BMV agricultural land) being present. However, only a small proportion of the land within the study area (less than 10%) is covered by an existing post 1988 ALC survey.

Mineral extraction

- 14.6.22 The sand and gravel river terrace deposits constitute the principal primary aggregate mineral resource in the study area, but London Clay (which is not an aggregate mineral) is also extracted commercially.
- 14.6.23 Historically, the area surrounding Heathrow has been extensively worked for minerals (sand and gravel) for many decades and there are still several active sand and gravel quarries and other areas with unworked sand and gravel resources within the study area, refer to Figure 14.7.
- 14.6.24 Many of these extraction pits have been backfilled and are recorded as historic or authorised landfills (see paragraphs on Landfills and waste disposal starting at 14.6.36).
- 14.6.25 A number of sites within the study area are designated in the Local Planning Authority local plans for possible future extraction, either because they have already been granted planning permission or because they are safeguarded areas, refer to Figure 14.7.

Geodiversity

- 14.6.26 There are no international or national geodiversity sites located within the study area.
- 14.6.27 There are currently no RIGS or LIGS located within the study area¹⁵.
- 14.6.28 In October 2016, the London Geodiversity Partnership (LGP) published a list of candidate sites for proposed consultation which were considered worthy of inclusion as LIGS or RIGS¹⁶. Of these, one, the proposed Sipson Lane Complex (LGP ref. GLA 62), is located within the study area and is adjacent to the east of the existing M4 spur road, refer to Figure 14.8. The LGP have proposed the Sipson Lane Complex as a RIGS based on preserving a face of the only remaining

¹⁵ Guide to Important Geological sites in London <http://www.londongeopartnership.org.uk/londonguide.html> (accessed 19 April 2017 and 30 January 2018)

¹⁶ Candidate RIGS and LIGS proposed for consultation <http://www.londongeopartnership.org.uk/new&proposedsites.html> (accessed 30 January 2018)



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working quarry in west London within the Greater London Authority (GLA) and that it provides a detailed view through the Langley Silts and river terrace deposits.

- 14.6.29 For the purposes of this Scoping Report, it is assumed that this geodiversity site will be designated as a RIGS prior to the DCO application being submitted.

Current and historical land use

- 14.6.30 A review of historical Ordnance Survey (OS) plans (dating from the 1860's to current day) and aerial photographs indicates that prior to circa 1900 the study area was predominantly rural. A number of villages (Longford, Harmondsworth and Colnbrook) were present along with small developments such as smithies, works, depots, piggeries and factories.
- 14.6.31 OS mapping and historical records indicate Heathrow originated in the late 1920's as a small airfield. Principal development and expansion of the airport took place in the 1940's, with its opening as London Airport in 1946 and renaming as Heathrow Airport in 1966. OS mapping shows that following this time, expansion and associated development has been on-going through to the present day.
- 14.6.32 Surrounding infrastructure was developed alongside the growing Airport including the M25, M4, water reservoirs and numerous local roads. Road and railway infrastructure was also developed below ground serving the airport including rail tunnels connecting tube and rail lines directly to the Heathrow terminals.
- 14.6.33 Historical gravel extraction has taken place extensively within the study area and is on-going in the present day. Many of these extraction pits were backfilled and are recorded as historic or authorised landfills depending on when they were filled (see paragraphs on Landfills and waste disposal starting at 14.6.36).
- 14.6.34 Other features noted on the historical plans which could act as a potential source of contamination include an explosive works, sewage farms, industrial estates, reservoirs, railway land/lines, gas works and cemeteries.
- 14.6.35 Plans showing the locations of these current and historical potential contamination sources identified from the desk study data obtained to date are included as Figures 14.9 to 14.17.



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Landfills and waste disposal

- 14.6.36 Environment Agency data indicates there are numerous historic landfills¹⁷ and authorised landfills¹⁸ within the study area. Figure 14.9 shows the locations of these authorised and historic landfills.
- 14.6.37 The landfills vary in age and design. Many of the historic sites and older authorised sites closed before the requirements of the Landfill Directive (LFD) came into force in July 2001, and were therefore constructed on the ‘dilute and disperse’ principle with little or no basal lining system. Furthermore, the historic sites and older authorised sites may have received additional non-reported material types. Those sites which are ‘LFD compliant’ are designed to modern standards with a fully engineered basal and sidewall lining system as well as capping systems and leachate and gas management infrastructure in place.
- 14.6.38 Principal contaminants produced by landfills and areas of infilling are in the form of leachate and landfill gas generated by decomposition of the organic components of the waste mass. The composition of the leachate at each location is highly dependent on the material deposited within the landfill.
- 14.6.39 Decomposition of the waste mass within a landfill may span decades and its rate is highly dependent on a number of factors including the composition of the waste mass and the moisture content. During this time leachate and landfill gas may be generated.
- 14.6.40 Locations have also been identified from the desk study data available to date that have, or have had a permit for the transfer or treatment of waste (and could therefore be potential sources of contamination), these are referred to on Figure 14.10 and include two sites which have had a permit to handle low-level non-nuclear (i.e. not from a nuclear power station) radioactive wastes.
- 14.6.41 Permitted waste facilities can handle, store, treat and transfer a wide range of chemicals and wastes. The operations that may be undertaken include screening, blending, segregation, packing, separation, compaction, incineration, washing and bailing of materials before transportation off site for recycling/disposal or use in a process.
- 14.6.42 In addition to the permitted facilities, Slough Borough Council (SBC) has identified one area of land used for the unauthorised storage of scrap vehicles that could

¹⁷ Historic landfill sites are known areas of landfilling where there is no pollution prevention control (PPC) permit or waste management licence currently in force. This includes sites that existed before the waste licensing regime and sites that have been licensed in the past but where this licence has been revoked, ceased to exist or surrendered and a certificate of completion has been issued.

¹⁸ Authorised landfill sites are known areas of landfilling currently authorised by the Environment Agency under the Environmental Permitting Regulations. Landfill permits are authorised by a Waste Management Licence, a PPC Permit or an Environmental Permit.



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potentially be contaminated. This site (SBC reference A61 Elbow Meadow) is referred to on Figure 14.10.

Geohazards

- 14.6.43 Significant mineral extraction of the river terrace deposits has been undertaken in the study area. However, this extraction has taken place from open quarries as opposed to tunnelled mining, reducing the risks of ground instability and geohazards associated with mines and shafts as a result of the extraction activities.
- 14.6.44 A review of the BGS data on the risks associated with geohazards including compressible and collapsible ground, seismic activity, running sand and landslides indicates that from the desk study data available to date, the risks from geohazards are negligible to low.
- 14.6.45 Landfills have the potential to generate landfill gases (for example carbon dioxide and methane) as a result of the decomposition of organic material. These landfill gases can present a risk to human health receptors due to their potential asphyxiating and combustion properties. The desk study data available to date indicates that a number of the existing and historical landfills contain, or have the potential to contain, putrescible and household materials which could decompose to give rise to landfill gases. In addition, a number of the landfills are known to have/have had measures in place to capture and mitigate risks associated with landfill gas.

Unexploded ordnance

- 14.6.46 A UXO report, obtained from Zetica Limited, indicates that 15 high explosive (HE) bombs fell in the desk study area immediately surrounding Heathrow during World War Two.
- 14.6.47 No significant concentrations of bombing have been identified in the desk study area immediately surrounding Heathrow and no records have been found indicating that any unexploded bombs (UXB) fell in this same area.
- 14.6.48 Additionally, no other significant military activity which is likely to have given rise to UXO/UXB has been identified in the desk study area immediately surrounding Heathrow.

Land Quality Preliminary Risk Assessment

- 14.6.49 In line with the approach set out in CLR11², the desk study data has been used to undertake a Preliminary Risk Assessment in order to develop a Conceptual Site Model (CSM).



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- 14.6.50 The CSM identifies the potential contaminant linkages between contaminants (sources) and receptors present in a given scenario (known as Source-Pathway-Receptor contaminant linkages).

Potential sources of contamination

- 14.6.51 Plans showing the locations of the potential contamination sources from the desk study data available to date are included as Figures 14.9 to 14.17, based on the grouping of the potential contaminant sources into the following categories:
1. Artificial Ground from landfills and infilled water features
 2. Waste management facilities and sewage works
 3. Railway land and electricity substations
 4. Oil and fuel storage and gas works sites
 5. Aircraft operation and maintenance facilities
 6. Mineral extraction sites and earthworks
 7. Tanks and industrial facilities
 8. Discharge consents and pollution incidents
 9. Other isolated facilities including graveyards, nurseries (with tanks), prison/detention centre, fire and ambulance station (with tanks).

Potential receptors

- 14.6.52 From the desk study data available to date, the receptors relating to human health which could be affected by the potential existing contamination sources include:
1. Residential
 2. Allotments
 3. Commercial/industrial
 4. Public open space
 5. Land and property (including land used for agriculture (crops and livestock), existing structures, utilities and infrastructure)
 6. Surface water (in relation to human health)
 7. Construction workers (during the construction phase).
- 14.6.53 Risks to ecological receptors (as defined in Part 2A) are considered in **Chapter 6: Biodiversity**.



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- 14.6.54 Controlled waters receptors include:
 1. Groundwater in superficial deposits (Principal and Secondary A Aquifers)
 2. Groundwater in bedrock (Lambeth Group Secondary A Aquifer/Chalk Principal Aquifer)
 3. Surface waters (i.e. streams, rivers, lakes and ponds).
- 14.6.55 Plans showing the location of receptors from the desk study data available to date are included as Figures 14.18 and 14.19.

Potentially active contaminant linkages

- 14.6.56 Schematic CSM’s for the construction and operation phases of the DCO Project have been developed based on the desk study data available to date and are included as Figures 14.20 and 14.21.

14.7 Likely significant effects requiring assessment

- 14.7.1 The following section sets out the topic specific effects for land quality, agricultural land quality and mineral resources. Cumulative effects resulting from the combination of effects from the DCO Project and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

Land quality

- 14.7.2 The initial CSM’s for the construction and operation phases of the DCO Project (refer to Figures 14.20 and 14.21) have been used to identify the likely significant land quality effects to be assessed in the ES, as detailed in Table 14.4.

Table 14.4 Likely significant land quality effects

Activity	Effect	Receptor
Construction		
Construction activities located on, or adjacent to landfills and other potentially contaminative sites such as industrial/waste management facilities and fuel storage/distribution facilities	Mobilisation of contamination <i>via</i> numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in contamination of controlled waters	Controlled waters receptors (groundwater in superficial deposits and surface waters)



Activity	Effect	Receptor
	Mobilisation of contamination <i>via</i> numerous pathways (including groundwater, surface water, leaching from soil, migration of vapours and windblown dusts) resulting in health impacts	Human health receptors (residential, allotments, commercial/industrial and public open space)
	Build-up of gases in confined spaces in existing or newly constructed infrastructure on and beyond the land required for the DCO Project	Human health receptors (residential, commercial/industrial and land and property)
	Exposure to contamination <i>via</i> direct contact, inhalation and/or ingestion of soils and dusts resulting in health impacts	Human health receptors (construction workers)
	Damage to newly constructed infrastructure from aggressive ground conditions (such as sulphate attack on concrete) and geohazards including unstable ground conditions	Human health receptors (land and property)
Excavation of borrow pits which are restored using excavated materials	Creation of new sources of contamination which have the potential to result in contamination of controlled waters and risks to human health during construction	Human health receptors (residential, commercial/industrial), Controlled waters receptors (groundwater in superficial deposits and surface waters)
Construction of infrastructure such as basements or piled foundations that extend below the base of the London Clay	Contaminant migration <i>via</i> the potential to introduce preferential pathways which would otherwise not be present resulting in contamination of controlled waters	Controlled waters receptors (groundwater in superficial deposits and groundwater in bedrock)
Construction vehicle and equipment maintenance and storage of fuels/oils for construction vehicles and equipment	Accidental spillages and leaks resulting in ground contamination and risks to human health during construction	Human health receptors (construction workers) Controlled waters receptors (groundwater in superficial deposits and surface waters)



Activity	Effect	Receptor
Operation		
Presence of significant quantities of Artificial Ground, disturbed landfill material or excavated and re-used landfill material beneath permanent infrastructure	Generation of landfill leachate, which, if not properly managed, could accumulate and/or migrate to controlled waters	Controlled waters receptors (groundwater in superficial deposits and surface waters)
	Damage to infrastructure from aggressive ground conditions and geohazards including unstable ground conditions and settlement	Human health receptors (land and property)
	Build-up of landfill gases in confined spaces in existing or newly constructed infrastructure on and beyond the development boundary	Human health receptors (residential, commercial/industrial and land and property)
Vehicle and equipment maintenance and use of a wide variety of chemicals including fuels/oils, de-icers and substances used in firefighting foams	Accidental spillages and leaks resulting in ground contamination	Human health receptors (commercial/industrial) Controlled waters receptors (groundwater in superficial deposits and surface waters)

14.7.3 It is noted that the assessment of significant effects for land quality is closely linked to other topics including **Chapter 5: Air quality and odour** and **Chapter 18: Water environment**. Contamination resulting from a major accident or disaster is covered in **Chapter 15: Major accidents and disasters**.

Agricultural land quality

14.7.4 The likely significant agricultural land quality effects are presented in Table 14.5 and will be assessed further in the ES.



Table 14.5 Likely significant agricultural land quality effects

Activity	Effect	Receptor
Construction		
Construction activities on land permanently taken for the DCO Project	Permanent loss of BMV agricultural land	BMV agricultural land
	Permanent loss of topsoil	Soils
	Changes to soil structure due to inappropriate storage and/or handling of soils or due to the use of heavy machinery which causes compaction	Soils
	Soil erosion due to inappropriate storage and/or construction activities	Soils
	Permanent loss of Sipson Lane Complex RIGS	Geodiversity sites
Construction activities on land temporarily required for construction of permanent infrastructure	Temporary loss of, or damage to BMV agricultural land	BMV agricultural land
	Temporary loss of topsoil	Soils
	Changes to soil structure due to inappropriate storage and/or handling of soils or due to the use of heavy machinery	Soils
	Soil erosion due to inappropriate storage and/or construction activities	Soils
	Temporary loss of, or damage to Sipson Lane Complex RIGS	Geodiversity sites
Operation		
The likely significant effects on agricultural land quality only occur where land is permanently taken for the DCO Project or temporarily used for construction activities.		
Therefore, there is no potential for significant agricultural land quality effects to occur following completion of the construction phase (i.e. in the operational phase).		

Mineral Safeguarding

- 14.7.5 The likely significant mineral safeguarding effects that may arise as a result of exploiting or sterilising mineral resources are as detailed in Table 14.6 (and will be assessed further in the ES).



Table 14.6 Likely significant mineral safeguarding effects

Activity	Effect	Receptor
Construction		
<p>Construction activities on land permanently taken for the DCO Project</p> <p>Use of borrow pits for the extraction of minerals to provide fill and aggregates to support the construction activities</p>	<p>Permanently prevent viable exploitation of a resource (through sterilisation or adjacent development) that is of a high significance, regionally or nationally</p>	<p>Active or mothballed quarry with substantial remaining reserves</p> <p>Sites allocated for mineral extraction in a local plan</p>
	<p>Significant loss of a resource (through extraction as part of the DCO Project) that cannot be accommodated by alternative sites at a local or regional level</p>	<p>Site allocated for mineral extraction in a local plan ('preferred area' etc.)</p> <p>Site allocated as a Safeguarded Mineral Site or Mineral Safeguarding Area in a local plan</p>
	<p>Viability of the operation of an ongoing mineral extraction site is clearly and demonstrably reduced</p>	<p>Areas subject to a general safeguarding policy designation (national policy and local plan) – greenfield and previously developed land</p>
	<p>Permanent sterilisation of a significant proportion of a mineral deposit (excluding those under ongoing extraction), but which are unlikely to be regionally or nationally significant in terms of overall mineral availability and supply</p>	<p>Greenfield sites with substantial mineral reserves subject to general safeguarding policy</p> <p>Redevelopment areas with substantial mineral reserves subject to general safeguarding policy</p>
	<p>Temporary sterilisation of a significant proportion of a mineral deposit (excluding those under ongoing extraction), but which would be expected to be reversed in the short to medium term</p>	
	<p>Temporary reversal of previous sterilisation allowing access to unworked minerals for a limited period prior to the new development being constructed</p>	<p>Redevelopment areas covered by existing development with substantial mineral reserves subject to general safeguarding policy</p>



<p>Operation</p> <p>The likely significant effects for minerals safeguarding only occur where land is permanently taken for the DCO Project or used to extract minerals to support the construction activities.</p> <p>Therefore, there is no potential for significant mineral safeguarding effects to occur following completion of the construction phase (i.e. in the operational phase).</p>
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14.8 Effects not requiring assessment

Land quality

14.8.1 At this stage of the DCO Project’s development, no effects have been identified that can be scoped out of further assessment.

Agricultural land quality

14.8.2 The effects proposed to be scoped out of the agricultural land quality assessment are detailed in Table 14.7.

Table 14.7 Potential effects to be scoped out of the agricultural land quality assessment

Activity	Effect	Receptor	Justification for scoping out
Construction activities on land permanently taken for the DCO Project or on land temporarily required for construction of permanent infrastructure	Permanent or temporary loss of, or damage to non-BMV agricultural land	Non-BMV agricultural land	The NN NPS (Section 5, Paragraph 176) states that “ <i>the decision maker should give little weight to the loss of agricultural land in grades 3b, 4 and 5</i> ”, i.e. non-BMV agricultural land. The NPPF states that in relation to planning decisions “ <i>local planning authorities should take into account the economic and other benefits of the best and most versatile agricultural land</i> ”. In addition, the Natural England 2018 guidance ¹⁹ identifies that government policies and legislation “ <i>aim to protect the BMV agricultural land and soils...</i> ” which is a reference to the UK Government 25 Year environment plan to “ <i>protect the BMV agricultural land and soils...</i> ”. Although the NPPF, UK Government and Natural England guidance does not preclude development on BMV land, it puts emphasis on using poorer quality land, that is land classified as Grade 3b, 4 and 5 of the ALC. For these reasons, only BMV land

¹⁹ Guide to Assessing Development Proposals on Agricultural Land. Natural England. January 2018.



Activity	Effect	Receptor	Justification for scoping out
			(defined as Grade 1, 2 and 3a of the ALC) is assessed to be of sufficient value that an effect on it could be significant. Whilst it is proposed to scope out the loss of non-BMV agricultural land, the emphasis of using poorer quality land has been included in the embedded design mitigation for the DCO Project as detailed in Section 14.10.

14.8.3 Prior to writing this Scoping Report, scoping out of effects on non-BMV agricultural land was presented and discussed with Natural England and the HSPG. No concerns over this approach were raised by Natural England or the HSPG.

Mineral safeguarding

14.8.4 The effects proposed to be scoped out of the minerals safeguarding assessment are detailed in Table 14.8.

Table 14.8 Potential effects to be scoped out of the mineral safeguarding assessment

Activity	Effect	Receptor	Justification for scoping out
Use of undeveloped parcels of land for construction works but which are not required as part of the DCO Project in the medium or long term	Short term, temporary loss of access to mineral deposits preventing extraction	Mineral resources	Loss of access to extract the mineral deposits is short term and temporary (only lasting for the period of construction) and could be reversed once construction activities are completed and the land is returned to its former use (and could therefore be extracted in the future by other parties)

14.8.5 Prior to writing this Scoping Report, scoping out of temporary loss of access to mineral deposits was presented to and discussed with Natural England and the HSPG. No concerns over this approach were raised by Natural England or the HSPG.

14.9 Proposed approach to the assessment

14.9.1 The study areas are set out in Section 14.4: Study areas. These will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed. Therefore, the study areas may evolve as appropriate.



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- 14.9.2 Whatever option, described for the components in **Chapter 3: The DCO project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Additional baseline information required

Land quality

- 14.9.3 The baseline for the land quality assessment will be established using the desk study for the final study area and Ground Investigation data.
- 14.9.4 The following additional information will be collected as part of finalising the land quality baseline and submitted as part of the DCO application within the ES:
1. Environmental information, via desk study, for the parts of the study area that to date have not been obtained (including geology, hydrogeology, landfill and geohazard information)
 2. Records held by local authorities and other third parties (such as landfill operators, land owners etc.) that to date have not been obtained (using reasonable endeavours to do so)
 3. Targeted site-specific data comprising information on geological ground conditions (from both an environmental and geotechnical perspective) and the hydrogeological, hydrological and ground gas regime. This will include temporal data to determine seasonal changes in the land quality regime
 4. Laboratory chemical analysis of soil, water and gas samples to determine the presence and magnitude of existing contamination in soil, groundwater, surface water and soil vapour.
- 14.9.5 The ground investigation (including the collection and laboratory analysis of soil, water and gas samples for environmental and geotechnical parameters) will be undertaken in line with current guidance and standard practice including:
1. British Standard BS10175:2011+A1:2013 Investigation of Potentially Contaminated Sites
 2. British Standard BS5930:2015 Code of Practice for Ground Investigations
 3. British Standard BS EN 1997-2:2007 Eurocode 7. Geotechnical design. Ground investigation and testing
 4. Environment Agency Model Procedures for the Management of Land Contamination (CLR-11)
 5. Institution of Civil Engineers, ICE, UK Specification for Ground Investigation, 2nd edition (2012).



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- 14.9.6 As the design and consultation processes progress and the land required for the DCO Project is refined, the need for (and extent of) additional baseline data will also be reviewed and updated.
- 14.9.7 The level of data collected to support the ES will be dependent on the availability of site access to undertake the Ground Investigation surveys, where required, for the assessment. Significant efforts are currently being made to access as much of the study area as possible. Ground investigation surveys will also continue beyond the DCO in order to support further evaluation and implementation of detailed design parameters and, where necessary, remediation options.

Agricultural land quality

- 14.9.8 As previously noted, the Provisional ALC mapping does not differentiate between Grades 3a and 3b and therefore it cannot be used to distinguish BMV agricultural land. The ALC Strategic Map provides information on the likelihood of BMV land being present for strategic purposes.
- 14.9.9 Consequently, it is the more detailed (post 1988) ALC field survey data that provides the most reliable data on agricultural land quality at site level. However, only a small proportion of the land being considered for the DCO Project (less than 10%) and in turn the study area is covered by an existing post 1988 ALC survey.
- 14.9.10 Therefore, additional baseline ALC surveys to determine the presence of BMV agricultural land will be undertaken on land within the study area currently in agricultural use²⁰ and not covered by an existing post 1988 ALC survey.
- 14.9.11 The ALC surveys will be undertaken according to the Natural England 2018 guidance¹⁹ (which also refers to the MAFF guidelines for conducting field surveys) and will involve:
1. Collection of soil observations (by spade and hand auger to 1.2m depth) in intervals across the survey site (one observation per hectare)
 2. Description of soil type and agricultural land grade encountered across the survey area utilising shallow hand-dug pits to examine the soil structure
 3. Laboratory testing of soils where required to support the classification process (for example particle size distribution analysis to support accurate determination of soil texture)

²⁰ This is land classified as arable or grassland through land use mapping. The following land uses are excluded from the ALC survey: surface water bodies, woodland, quarries, hardstanding, buildings and amenity grassland (e.g. parks and recreation grounds).



4. Reporting of ALC survey findings setting out the methodology used and findings (including plans/maps showing the approximate areas of ALC grades across the survey site).
- 14.9.12 As the design and consultation processes progress and the land required for the DCO Project is refined, the need for (and extent of) additional baseline data will also be reviewed and updated.
- 14.9.13 The extent of the baseline field surveys will be dependent on the availability of site access to undertake the ALC surveys, where required, for the assessment. Significant efforts are currently being made to access a wider area as is possible within the study area. However, where ALC surveys are required and site access is not available, the provisional ALC mapping and strategic ALC map data will be used to undertake the assessment.

Minerals safeguarding

- 14.9.14 The baseline for the minerals safeguarding assessment will be established using the desk study data and details of the DCO Project.
- 14.9.15 The following additional information will be collected/reviewed as part of finalising the mineral resources baseline:
1. Planning permissions and records for existing minerals extraction and safeguarded sites held by Local Authorities, Minerals Planning Authorities and Aggregate Working Parties not yet obtained (using reasonable endeavours to do so)
 2. Ground Investigation data and borehole records obtained as part of the ground investigation as detailed in paragraph 14.9.4.
- 14.9.16 Where the availability and quality of historic and future Ground Investigation data allows, an approximate estimation of the distribution and volume of ‘workable’ mineral resources will be developed as part of the minerals safeguarding baseline.
- 14.9.17 As the design and consultation processes progress and the land required for the DCO Project is refined, the need for (and extent of) additional baseline data will also be reviewed and updated.

Assessment years

- 14.9.18 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3 Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the land quality, agricultural land quality and minerals safeguarding assessments specifically.



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Land quality

- 14.9.19 It is noted that a number of the existing landfills are currently subject to restoration plans/remediation agreed with the Environment Agency and are in the process of being implemented. Where information obtained during the desk study provides certainty that the restoration plans will be implemented prior to the DCO being granted, consideration will be given to undertaking the land quality assessment which takes into account completion of the restoration plans/remediation.
- 14.9.20 The assessment of significant effects during the construction phase will be based on the year of maximum predicted environmental effects which, for land quality, will be a period of time equating to the peak earthworks and above ground infrastructure construction activities.
- 14.9.21 The assessment of significant land quality effects during the operational phase will be based on the year of maximum ATM capacity or the year of maximum environmental effects during the operational phase (if different). The assessment will take into account the requirements for on-going monitoring of controlled waters and ground gas (if required).

Agricultural land quality

- 14.9.22 The agricultural land quality assessment will be based on the year of maximum predicted environmental effects during construction.
- 14.9.23 As the likely significant effects on agricultural land quality, soils or geodiversity only occur where land is permanently taken for the DCO Project or temporarily used for construction activities, the year of maximum predicted environmental effects will be the time a specific piece of land is required to be developed or used for temporary construction activities.

Minerals safeguarding

- 14.9.24 Given the anticipated length of time that will likely pass between the submission of the DCO and construction work commencing, it is noted that existing working mineral extraction sites will have reduced quantities of mineral resources at the point of construction and non-mineral development around a safeguarded site may limit the potential for that safeguarded site to be worked in the future (or indeed as part of the DCO Project).
- 14.9.25 There are a number of mineral extraction sites within the study area where minerals are currently being extracted and/or restoration plans are being implemented. Where information obtained during the desk study provides certainty over the extent of mineral extraction or restoration that will be implemented prior to the DCO being granted, this extraction/restoration will be considered during the assessment.



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- 14.9.26 The minerals safeguarding assessment will be based on the year of maximum predicted environmental effects during construction.
- 14.9.27 As the likely significant effects on mineral safeguarding only occur where land is permanently taken for the DCO Project or used to extract minerals to support the construction activities, the year of maximum predicted environmental effects will be the time a specific piece of land is required to be developed or used for temporary construction activities.

Construction assessment methodology

- 14.9.28 The following section sets out the construction assessment methodology for each of the land quality, agricultural land quality and mineral safeguarding topics.
- 14.9.29 For land quality, the assessment approach includes for consideration of the final specific land use within the CSM that will be developed as part of the assessment. For agricultural land quality and mineral resources, the potentially significant effects only occur where land is permanently taken for the DCO Project or used for construction activities (as opposed to whether a land parcel currently shown for carparking changes to land required for commercial development).
- 14.9.30 Therefore, for individual parcels of land within the study area, where the final end-use changes from that currently outlined in **Chapter 3: The DCO Project**, this will not affect the assessment methodologies for the land quality, agricultural land quality and mineral safeguarding topics.
- 14.9.31 It is noted that where the change in specific land use introduces or removes basement structures, there will be changes in respect of the potential for aggregate minerals to then be sterilised or extracted as part of the DCO Project. However, the existing mineral safeguarding methodology covers this scenario as part of the assessment process.

Land quality

- 14.9.32 The land quality assessment approach and associated methodologies outlined in this section have been developed to combine the requirements of the UK legislative framework for the assessment and management of potentially contaminated land (an overview of which is presented in **Appendix 14.1: Land Quality Approach to Human Health and Controlled Waters Risk Assessment**) with the assessment of potentially significant land quality effects within the EIA process.
- 14.9.33 This approach incorporates current standard practice including statutory and non-statutory guidance and codes of good practice, in particular the phased and iterative approach set out in CLR11 (see Section 3 of **Appendix 14.1**) comprising



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Preliminary Risk Assessment (as part of the Desk Study) followed by Quantitative Risk Assessment (QRA) following collection of Ground Investigation data.

- 14.9.34 The evaluation of significance for land quality effects will be undertaken using the following methodology:
1. The initial CSM's presented in Figures 14.19 and 14.20 will be refined based on the desk study and ground investigation data to provide final CSM scenarios representing the baseline and each of the construction phase assessment years
 2. For each of the CSM scenarios, the QRA process will be used to evaluate the level of risk from measured concentrations of contaminants of concern in soil, groundwater, surface water and vapour to the identified receptors
 3. Significant land quality effects will be identified based on the presence of contaminants in soil, groundwater, surface water and vapour which exceed the applicable QRA screening values, alongside professional judgement considering the changes in the CSM between baseline and construction phase and the context of the contaminant exceedance (for example a spatially isolated or marginal exceedance).
- 14.9.35 The selection of appropriate screening criteria to be used in the QRA is outlined in **Appendix 14.1**.
- 14.9.36 Prior to writing this Scoping Report, a draft copy of the QRA approach was issued to the Environment Agency (as the UK regulator responsible for controlled waters) and Local Planning Authority contaminated land officers (as the UK regulator responsible for human health) for comment.
- 14.9.37 Copies of their comments on the draft document are presented in **Appendix 14.2: Land Quality Environment Agency correspondence** and **Appendix 14.3: Land Quality Local planning authorities correspondence** and gave broad agreement with the QRA approach being taken.
- 14.9.38 The comments received have been addressed and incorporated into the final QRA approach presented in **Appendix 14.1**.
- 14.9.39 It is noted that the potential human health and controlled waters receptors will change during and post-construction, for example through the creation of new river channels or introduction of new commercial properties.
- 14.9.40 The CSM's and land quality assessment presented in the ES will take into account these changes in receptors and the associated changes in distances from identified existing contamination sources to the new receptor locations (for example the relocation of a river channel may increase or decrease the distance



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from a potential existing contaminant source which remains undisturbed by the DCO Project).

Agricultural land quality

- 14.9.41 The approach and associated methodologies have been developed to meet the requirements of national policies relevant to the assessment of effects on agricultural land quality, soils and geodiversity as set out in Table 14.1.
- 14.9.42 The assessment of likely significant effects on agricultural land quality will primarily be based on the extent of BMV agricultural land, soils and geodiversity sites that might be affected and whether the effects would be permanent or temporary.
- 14.9.43 The assessment will also be informed by:
1. Information about the construction and operational activities associated with the DCO Project
 2. Relevant national policy, strategy, legislation and guidance documents
 3. Stakeholder engagement feedback
 4. Professional judgement.
- 14.9.44 The evaluation of significance for agricultural land quality will be undertaken using professional judgement, drawing upon information about the area of BMV agricultural land (defined as Grade 1, 2 and 3a of the ALC) which might be lost or damaged together with contextual data about BMV land within the study area.
- 14.9.45 The revised draft ANPS seeks to protect, conserve and enhance soils as a resource. Ensuring healthier soils is also recognised in the UK Government 25 Year Environment Plan²¹. Consequently, soils are assessed to be of sufficient value on their own that an effect on them could be significant. The evaluation of significance for soils will be undertaken using professional judgement, drawing upon information about the nature and extent of the soil resources present.
- 14.9.46 The NPPF states that in relation to protection of geodiversity sites “*Distinctions should be made between the hierarchy of international, national and locally designated sites*”. For this reason, and in the absence of any international or national geodiversity sites in the study area, only RIGS and LIGS are assessed to be of sufficient value that an effect on them could be significant in terms of geodiversity.
- 14.9.47 The evaluation of significance for geodiversity sites will be undertaken using professional judgement, drawing upon information about the value of the geodiversity feature which might be lost (that is to say the reason for its

²¹ HM Government, 25 Year Environment Plan, January 2018.



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designation and the extent to which there are other examples of the designated geodiversity features within the vicinity of the DCO Project).

- 14.9.48 An informed judgement will then be made as to whether an agricultural land quality, soil or geodiversity effect is either 'significant' or 'not significant'.

Minerals safeguarding

- 14.9.49 The legislative framework, including statutory guidance, for the minerals safeguarding assessment is set out in detail in **Appendix 14.4: Minerals Safeguarding Policy Context**.
- 14.9.50 There is no established methodology for assessing the environmental effects of a development on mineral safeguarding. The proposed methodology has therefore been developed based on the guidance detailed in **Appendix 14.4** and professional experience.
- 14.9.51 The approach to the minerals safeguarding assessment is outlined in detail in **Appendix 14.5: Minerals Safeguarding Assessment Approach** and summarised in this section.
- 14.9.52 The output from the assessment process outlined in **Appendix 14.5** will be used to assess the significance of the mineral resources effects of the DCO Project within the ES and determine the requirement for mitigation.
- 14.9.53 A summary of the receptor sensitivity criteria is presented in Table 14.9.

Table 14.9 Summary of sensitivity criteria for minerals safeguarding

Mineral Resource	Planning Designation	Overall Sensitivity
Nationally important aggregate or industrial mineral, widely distributed and with substantial regional and local reserves	Areas with limited reserves and subject to a safeguarding designation or policy presumption	Low
	Redevelopment areas with substantial reserves subject to general safeguarding policy	Low
Nationally important aggregate or industrial mineral, widely distributed and with limited regional and local reserves	Site allocated in a Local Plan for sand and gravel extraction and with substantial reserves	High
	Areas with substantial reserves and subject to a safeguarding designation or policy presumption	Medium
	Areas with limited reserves and subject to a safeguarding designation or policy presumption	Low



Mineral Resource	Planning Designation	Overall Sensitivity
	Areas with negligible reserves subject to safeguarding designation or policy presumption	Negligible
	Green field areas with substantial reserves subject to general safeguarding policy	Medium
	Redevelopment areas with substantial reserves subject to general safeguarding policy	Medium
Nationally important aggregate or industrial mineral sparsely distributed and with limited regional and local reserves	Active or mothballed quarry with substantial remaining reserves	High
Important non-aggregate mineral widely distributed and with accessible regional and local reserves	The DCO Project's development sites	Low

14.9.54 The criteria for evaluation of magnitude of effects is summarised in Table 14.10.

Table 14.10 Evaluation of magnitude of effects for minerals safeguarding

Magnitude	Criteria
High	Development permanently prevents viable exploitation of a resource. Development causes a significant loss of a resource that cannot be accommodated by alternative sites at a local or regional level Development directly and negatively affects the operation of an ongoing mineral extraction site, to the extent that its viability is clearly and demonstrably reduced.
Medium	Development has permanent effects that will sterilise a significant proportion of a mineral deposit (excluding those under ongoing extraction) Development has temporary effects that sterilise a significant proportion of a mineral deposit (excluding those under ongoing extraction), but which would be expected to be reversed in the short to medium term.
Low	Development permanently affects a minor proportion of a mineral deposit, to an extent that is unlikely to significantly affect its overall viability or quality Development has temporary effects that sterilise minor parts of a mineral deposit (excluding those under ongoing extraction), which would be expected to be reversed in the short to medium term.
Negligible	Development has no permanent or temporary effects on mineral deposits that would affect the ability to extract the deposits, their viability or their quality.



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- 14.9.55 In accordance with the general approach set out in Section 4.2: Approach to identifying likely significant effects of this Scoping Report, it is proposed that where the combined sensitivity and magnitude of mineral safeguarding effects are assessed as major, these will be considered to be significant for the purposes of the EIA (shown red in Table 14.11).

Table 14.11 Determination of significant effects for minerals safeguarding

Sensitivity of Receptor	Magnitude of Effects			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

Operation assessment methodology

- 14.9.56 For land quality, the operation assessment methodology will be the same as the construction assessment methodology except that the contaminant linkages used to determine the significant land quality effects will be based on CSM's representative of the operational phase assessment years as opposed to the CSM's developed for the construction phase assessment years.
- 14.9.57 The operational phase CSM will take into account the potential for sources and/or receptors to have moved relative to each other, for example the repositioning of river corridors and the presence of new permanent airfield infrastructure as described in **Chapter 3: The DCO Project**.

14.10 Approach to mitigation

- 14.10.1 In accordance with the approach set out in paragraphs 4.2.14 – 4.2.19 of this Scoping Report, embedded mitigation measures have already been incorporated into the DCO Project design development process to avoid or reduce significant land quality, agricultural land quality and mineral safeguarding effects through:
1. Prioritisation of development which avoids or reduces the interaction with areas of known land contamination such as landfills and introduces geotechnical development design that avoids or reduces the potential effects
 2. Prioritisation of development on non-BMV agricultural land or areas not adjacent to geodiversity sites



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3. Avoiding or limiting the sterilisation of mineral resources or incorporating the prior extraction of mineral resources into the DCO Project (e.g. through prioritisation of development with basement structures).

14.10.2 'Additional' and 'best practice' mitigation measures for each of the land quality, agricultural land quality and mineral safeguarding topics are detailed in the following section.

Land quality

14.10.3 Where embedded mitigation is not possible, and the QRA indicates that existing contamination presents a potential risk to human health or the environment based on the future use of the land required for the DCO Project, 'additional' mitigation will be undertaken in which a remediation strategy will be developed to break the contaminant linkage and mitigate/manage the risk.

14.10.4 The approach to remediation, where required, will follow the approach outlined in CLR11 and will incorporate the following:

1. Completion of a Remediation Options Appraisal (ROA) to identify appropriate techniques to break the identified contaminant linkages having regard to the costs, practicality, effectiveness and timescale which are likely to be involved in the remediation and the seriousness of harm, or pollution of controlled waters (the reasonableness test under Part 2A)
2. Development of a Remediation Implementation and Verification Plan (RIVP) outlining the contaminant linkages requiring remediation, the remediation technique selected from the ROA to manage each linkage, the approach to implementing that technique prior to, or during, the DCO Project and an outline of the monitoring required to verify that the remediation has been successful. The outputs from the QRA process will be used to guide the end-point of the remediation required.

14.10.5 Where required, remediation will be carried out to ensure that the resulting land is suitable for the future use of the land required for the DCO Project. Following completion of the remediation, the land should not be capable of being designated as Contaminated Land under Part 2A.

14.10.6 Where geohazards, such as unstable/unsuitable ground conditions, are identified, 'additional' mitigation will be developed as part of the construction design to mitigate/manage the risks (for example the use of piling, *in-situ* ground improvement techniques or excavation and replacement of poor material).

14.10.7 As part of the construction activities, a draft CoCP, which will incorporate the requirements for a Materials Management Plan (MMP), will be developed.



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- 14.10.8 'Best practice' mitigation measures will be incorporated into the draft CoCP to mitigate potential environmental risks from construction activities (such as vehicle and equipment maintenance, storage of fuels/oils on hardstanding and dealing with associated leaks or accidental spills).
- 14.10.9 The draft CoCP will also outline the requirements for the management of risks to construction workers during the construction phase of the DCO Project in line with the Health and Safety at Work Act 1974 (and regulations made under the Act) and the Construction Design Management (CDM) Regulations 2015 which look at a hierarchy of hazard control from elimination (by physically removing the hazard) through to the use of Personal Protective Equipment (PPE) and adoptions of good site hygiene practices.
- 14.10.10 The MMP will outline a process which seeks to retain materials (such as Made Ground, landfill material, natural soils and river sediments) for reuse within the DCO Project (for example as general earthworks fill, landscaping etc.) and detail procedures for the screening and treatment of excavated soils to ensure they are suitable for the proposed reuse in line with the CL:AIRE 2011 Definition of Waste: Development Industry Code of Practice (DoW CoP)²².
- 14.10.11 The draft CoCP will also document the requirements for a groundwater, surface water and ground gas monitoring programme prior to, during and after construction works. The spatial and temporal extent of the long-term post construction monitoring will be determined based on the DCO Project proposals and an assessment of existing and post construction conditions.
- 14.10.12 It is also anticipated that a number of activities within the DCO Project will require an Environmental Permit from the Environment Agency and will be subject to appropriate controls through that process.
- 14.10.13 In addition, the detailed design requirements for individual elements of the DCO Project (e.g. fuel storage facilities) will be developed in line with best practice design standards/guidance which incorporate measures to prevent/minimise environmental pollution.

Agricultural land quality

- 14.10.14 Where embedded mitigation is not possible, 'best practice' mitigation measures will be incorporated into the draft CoCP and MMP which will seek to retain clean topsoil for reuse on the DCO Project.
- 14.10.15 The draft CoCP and MMP will also identify 'standard practice' measures to maintain soil integrity during excavation and removal/transport.

²² CL:AIRE, Definition of Waste: Development Industry Code of Practice, 2011



Minerals safeguarding

- 14.10.16 The proposal to use borrow pits to source minerals for engineering fill and aggregate products will act as ‘additional’ mitigation helping to offset any unavoidable sterilisation of minerals elsewhere on the DCO Project. Some of these sites may not have been previously economic or accessible, for example because of their lack of physical accessibility, marginal economics or other physical and policy constraints. The DCO Project will therefore enable these resources to be put to beneficial use and may furthermore provide mitigation and compensation for other topics (for example by allowing reinstatement of borrow pits for flood storage or biodiversity offsetting).
- 14.10.17 The DCO Project also involves ‘displaced uses’ which opens up currently or previously developed sites with unworked minerals for a limited period prior to the new development being constructed. If feasible and practical, prior extraction as part of the DCO Project will be considered as ‘additional’ mitigation to unlock and utilise some of the mineral resources previously sterilised by existing development.
- 14.10.18 ‘Best practice’ mitigation measures will be incorporated into the draft CoCP and MMP which will seek to maximise the reuse of clean mineral resources excavated as part of the DCO Project.



Chapter 15

Major accidents and disasters



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15. MAJOR ACCIDENTS AND DISASTERS

15.1 Introduction

- 15.1.1 This chapter describes the scope of the assessment as it relates to major accidents and disasters. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 15.1.2 This chapter describes:
1. The major accidents and disasters policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. Study area for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of potential major accidents and disasters
 7. Effects not requiring assessment
 8. The proposed approach to the assessment
 9. Approach to mitigation.
- 15.1.3 A ‘major accident’ has been defined as an occurrence resulting from an uncontrolled event caused by a man-made activity or asset leading to serious damage on receptors, either immediate or delayed. The term ‘disaster’ is used to describe a natural occurrence leading to serious damage on receptors, either immediate or delayed. A list of definitions used throughout this chapter relevant to the methodology proposed is provided in **Appendix 15.1: Definitions**.
- 15.1.4 Major accidents and disasters is a new topic within The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The purpose of this chapter is to outline the proposed approach to the assessment, which is based on established approaches for major accident and disaster risk assessment and associated tolerability developed for other UK regulatory purposes. The DCO Project seeks the support of the consultees for the proposed approach, and confirmation that it is suitable and adequate for the DCO Project assessment and the requirements of the consultees.



15.2 Policy and legislation

- 15.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 15: Major accidents and disasters**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.
- 15.2.2 The main policy and legislation relevant to the major accidents and disasters assessment methodology are detailed in Table 15.1.

Table 15.1 Policy and legislation relevant to the major accidents and disasters assessment

Relevant policy / legislation	Relevance to the assessment
Policy – UK	
Revised draft Airports National Policy Statement (revised draft ANPS)¹	<p>The revised draft ANPS provides the primary basis for decision-making on development consent applications for a Northwest Runway at Heathrow, and will be an important and relevant consideration in respect of applications for new runway capacity and other airport infrastructure in London and the South East of England.</p> <p>The revised draft ANPS covers a range of issues which have the potential to influence the cause, severity or likelihood of Major Accidents and Disasters (e.g. climate change, flood risk).</p> <p>Para 4.43 states that where there are safety critical elements of the design with a design life of 60 years or greater the applicant should apply the latest UK Climate Projections for 2080 against the 10, 50 and 90% probability levels so as to include high impact, low likelihood scenarios.</p> <p>Paras 4.60 – 4.65 state that government policy regarding the prevention of terrorism will apply at the expanded airport and that adequate consideration must be given in the design to the management of security risks. They also state that the development must comply with the UK civil aviation safety regime regulated by the CAA and that the applicant should consult with relevant security experts from the Centre for the Protection of National Infrastructure and the Department for Transport to ensure that physical, procedural and personnel security measures have been adequately considered in the design process, and that adequate consideration has been given to the management of security risks.</p> <p>Para 4.65 also states that the expanded airport must comply with aviation security regulations and guidance in the same way as existing airport.</p> <p>Para 5.49 notes that “<i>Precise flight path designs can only be defined at a later stage after detailed airspace design work has taken place</i>” and “<i>Once the design work has</i></p>

¹ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant policy / legislation	Relevance to the assessment
	<p><i>been completed, the airspace proposal will be subject to extensive consultation as part of the separate airspace decision making process established by the Civil Aviation Authority.</i>" The decision making process for this separate consenting regime is defined in UK Air Navigation Guidance 2017 (ANG)² and in Civil Aviation Authority (CAA) CAP 1616³ in line with UK aviation / airspace policy. This has been used to inform the scoping assessment.</p> <p>Para 5.171 states that the planning authority should ensure that water receptors are not put at unacceptable risk or adversely affected by water pollution.</p> <p>Para 5.225 discusses the need to avoid unacceptable risk due to land instability.</p>
<p>National Planning Policy Framework (NPPF): Draft for Consultation (March 2018)⁴</p>	<p>The NPPF sets out the government's planning policies for England and how they are expected to be applied. It provides a framework by which local and neighbourhood plans can be developed. In March 2018, a draft version was released for consultation which will supersede the 2012 document below when it has been agreed and accepted.</p> <p>Paragraph 96 states that planning policies and decisions should promote public safety and take into account wider security and defence requirements by:</p> <ul style="list-style-type: none"> a) Anticipating and addressing all plausible malicious threats and natural hazards, especially in locations where large numbers of people are expected to congregate. Local policies for relevant areas (such as town centre and regeneration frameworks), and the layout and design of developments, should be informed by the most up-to-date information available from the police and other agencies about the nature of potential threats and their implications. This includes appropriate and proportionate steps that can be taken to reduce vulnerability, increase resilience and ensure public safety and security; b) Recognising and supporting development required for operational defence and security purposes, and ensuring that operational sites are not affected adversely by the impact of other development proposed in the area. <p>Paragraph 194 of the draft NPPF identifies that Local Planning Authorities should consult appropriate bodies when planning, or determining applications for developments around major hazards.</p>
<p>National Planning Policy</p>	<p>The NPPF sets out the governments planning policies for England and how they are expected to be applied. It provides a framework by which local and neighbourhood plans can be developed.</p>

² Department for Transport, Air Navigation Guidance, 2017

³ Civil Aviation Authority, CAP1616 Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, 2017

⁴ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018



Relevant policy / legislation	Relevance to the assessment
Framework (NPPF) (2012)⁵	Paragraph 164 specifically identifies that account should be taken by local advisors and others of up to date information on higher risk sites in their area for malicious threats and natural hazards, including steps that can be taken to reduce vulnerability and increase resilience.
Reducing Risks Protecting People (R2P2)	<p>Health and Safety Executive's (HSE) decision making process. Protocols and procedures followed in decision making in relation to the protection of human life in the UK.</p> <p>The tolerability criteria for risk to people, including the aversion for large numbers of casualties resulting from single incidents, has been referenced in setting the criteria for assessing the significance of effects on people.</p>
Control of Development in Airport Public Safety Zones	Outlines policy for controlling development in the vicinity of airports based on individual risk of air accident for people on the ground around the airport.
Legislation – UK	
Health and Safety at Work Act 1974	<p>The primary legislative instrument covering workplace health and safety in Great Britain. The Act establishes various obligations to ensure, so far as is reasonably practicable, that persons are not exposed to risks to their health and safety.</p> <p>The Health and Safety Executive, along with local authorities, are responsible for enforcing the Act.</p> <p>Many Regulations made under the Act⁶ are applicable to the DCO Project for the obligations they place on employers to assess risks and to implement controls. Associated Approved Codes of Practice and Guidance describe how the Regulations can be met. These will be used in the assessment to determine the significance of the effect and to identify embedded mitigation arising from adherence to standards and practice.</p>
Control of Major Accident Hazards Regulations 2015 (COMAH)	<p>COMAH is designed to prevent major accidents involving dangerous substances and limit the consequences to people and the environment of any accidents which do occur.</p> <p>COMAH applies to establishments, with some limited industry exceptions, which have any dangerous substance(s) specified in COMAH in an aggregate quantity at or above a qualifying threshold.</p> <p>For those sites to which COMAH applies, specific obligations exist to support the management of major accidents and disasters (environmental and safety risk). A level</p>

⁵ Department for Communities & Local Government, National Planning Policy Framework, 2012

⁶ The Health and Safety at Work Act is an enabling Act under which almost all other Health and Safety regulations are made.



Relevant policy / legislation	Relevance to the assessment
	<p>of demonstration is also required which is proportionate to the level of risk posed by the establishment, and the quantity of dangerous substances involved.</p> <p>Standards and guidance issued in support of COMAH have been referenced in developing the methodology for scoping and assessment, including for identifying potential major accidents and disasters and setting the thresholds and criteria for assessing the significance of effects on the environment.</p> <p>The Seveso III Directive is implemented in Great Britain through COMAH Regulations 2015 and through planning legislation⁷.</p> <p>COMAH is enforced by the COMAH Competent Authority. In England, this comprises the Health and Safety Executive (other than for specific industries such as the nuclear industry) and the Environment Agency (EA).</p>

15.2.3 Further information concerning other legislation and guidance relevant to the major accidents and disasters assessment methodology is provided in **Appendix 15.2: Relevant legislation, national and local planning policies**.

15.3 Stakeholder engagement

15.3.1 Engagement with consultees on this topic for the EIA is intended to occur in parallel with the submission of the Scoping Report. Further details of the proposed stakeholder engagement are provided in Table 15.2.

Table 15.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Environment Agency	Meeting held in April 2018 to introduce topic and timetable including future engagement (Joint with HSE)	Meetings to discuss: <ol style="list-style-type: none"> 1. Environment Agency priorities 2. Approach to assessment 3. Emerging findings and mitigation strategy.

⁷ For example, Planning (Hazardous Substances) Regulations 2015.



Consultee	Engagement undertaken to date	Proposed future engagement
Civil Aviation Authority (CAA)	Meeting held in April 2018 to discuss EIA timetable and future engagement.	Meetings to discuss: <ol style="list-style-type: none"> 1. Introduce major accident and disasters topic and timetable including further engagement 2. CAA priorities 3. Approach to assessment 4. Emerging findings and mitigation strategy.
Health and Safety Executive (HSE)	Meeting held in April 2018 to introduce topic and timetable including future engagement (joint meeting with Environment Agency)	Meetings to discuss: <ol style="list-style-type: none"> 1. HSE priorities 2. Approach to assessment 3. Emerging findings and mitigation strategy.
Heathrow Strategic Planning Group (HSPG)	-	Meetings to discuss: <ol style="list-style-type: none"> 1. Introduce topic and timetable including future engagement 2. HSPG priorities 3. Approach to assessment 4. Emerging findings and mitigation strategy.
Natural England	-	Meetings to discuss: <ol style="list-style-type: none"> 1. Introduce topic and timetable including future engagement 2. Natural England priorities 3. Approach to assessment 4. Emerging findings and mitigation strategy.

15.4 Study area

15.4.1 The proposed study area is shown on Figure 15.1. It is based on the maximum extent of land which could be developed and could form part of the final DCO Project taking into account all options presented in **Chapter 3: The DCO Project** of this Scoping Report plus:

1. 1km for land receptors, including human populations outside of the Airport (including workers and public), inside the airport (workers, third parties, the public and occupants of aircrafts), designated land, biodiversity and cultural heritage
2. 1km for groundwater receptors
3. 10km for surface water receptors.



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- 15.4.2 The distances and buffers used for the study area are based on consideration of the nature of potential major accidents and disasters at Heathrow and have been informed by expert judgement aligned with experience from assessment of potential major accidents and disasters at similar facilities.
- 15.4.3 For aircraft incidents only, occupants of aircraft under the control of Heathrow air traffic controllers and receptors within the flight swathe of Heathrow and under the control of Heathrow air traffic controllers are included, to the extent that the effects of and on a major accident or disaster can be influenced by the DCO Project.

15.5 Data sources used in scoping

Baseline data collection

- 15.5.1 Baseline information relevant to the topic of major accidents and disasters includes baseline information representative of the existing Airport and baseline information from other topics where this is within the study area described in Section 15.4 and is relevant to major accidents and disasters.

Desk study

- 15.5.2 Data and information sources used in the scoping assessment for major accidents and disasters is presented in Table 15.3.

Table 15.3 Data sources used for scoping

Source	Data
HSE	HSE's Planning Application advice - Planning Advice Web App ⁸
European Commission (EC)	Major Accident Reporting System (eMARS)
CAA	CAP 1036: Global Fatal Accident Review 2002 to 2011
Community Risk Register⁹ for Thames Valley	Potential external major accidents and natural disasters identified by local authorities that may affect Heathrow
West London Local Resilience Forum Community Risk Register	Potential external major accidents and natural disasters identified by local authorities that may affect Heathrow

- 15.5.3 Information about potential receptors has also been obtained and reviewed from other topic chapters, including from desk top reviews and surveys conducted to date related to:

⁸ HSE's Planning Application advice - Planning Advice Web App
<http://www.hse.gov.uk/landuseplanning/padhi.htm> (accessed 16 February 2018)

⁹ Maintained in accordance with The Civil Contingencies Act 2004



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1. Designated land and habitats – refer to **Chapter 6: Biodiversity**
 2. Widespread habitat (non-designated land) - refer to **Chapter 6: Biodiversity, Chapter 9 Community, Chapter 13 Landscape and visual amenity** and **Chapter 14: Land quality**
 3. Widespread habitat (non-designated water) - refer to **Chapter 6: Biodiversity**
 4. Groundwater sources – refer to **Chapter 18: Water environment**
 5. Soil sediment – refer to **Chapter 14: Land quality**
 6. Built environment (including cultural heritage) – refer to **Chapter 11: Historic environment**
 7. Particular species – refer to **Chapter 6: Biodiversity**
 8. Marine, freshwater and estuarine habitats – refer to **Chapter 18: Water environment**
 9. Employees and visitors at Heathrow, including users and workers within the study area – refer to **Chapter 10: Economics and employment**
 10. Residential houses, community premises and commercial/industrial premises and their human populations – refer to **Chapter 9: Community**
 11. Users of the local road and transport network within the land being considered for the DCO Project – refer to **Chapter 17: Traffic and transport.**
- 15.5.4 Relevant desk studies produced by other chapter topics on receptors or on existing potential major accidents and disasters will be utilised when they are available to inform the detailed assessment.
- 15.5.5 Additional information concerning potential major accidents and disasters and existing measures in place to reduce risk was gathered through interviews with Heathrow personnel and subject matter experts.
- 15.5.6 The effect and extent of increased road related traffic is not considered in the major accidents and disasters topic. This is considered in **Chapter 17: Traffic and transport.**

Baseline surveys

- 15.5.7 Similar to the approach taken for the desk study, baseline survey information produced by other topics has been used where it is relevant to the major accidents and disasters assessment. This includes using information concerning potential receptors.



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15.6 Baseline conditions

- 15.6.1 The baseline conditions relevant to the major accidents and disasters assessment has largely been informed by other topic chapters' baseline data collection.
- 15.6.2 A list of receptors that have been identified is provided in **Appendix 15.3: List of receptors**.
- 15.6.3 Further description of the receptors that have been identified are provided in other chapters listed in Table 15.4.

Table 15.4 Sources of information for receptors

Receptor type	Receptor description located in:
Designated land (internationally important)	Chapter 6: Biodiversity
Designated land (nationally important)	Chapter 6: Biodiversity
Other designated land	Chapter 6: Biodiversity
Scarce habitat	Chapter 6: Biodiversity
Widespread habitat (non-designated land)	Chapter 6: Biodiversity, Chapter 9 Community, Chapter 13 Landscape and visual amenity, Chapter 14: Land quality
Widespread habitat (non-designated water)	Chapter 6: Biodiversity
Groundwater source (drinking water)	Chapter 18: Water environment
Groundwater source (non drinking water)	Chapter 18: Water environment
Soil and sediment	Chapter 6: Biodiversity, Chapter 14: Land quality, Chapter 18: Water environment
Built environment (designated buildings / sites)	Chapter 11: Historic environment (Major accidents and disasters are limited to status at or above Grade 1 listed, Conservation Areas, World Heritage sites and scheduled monuments)
Particular species ¹⁰	Chapter 6: Biodiversity
Marine environment	Chapter 18: Water environment
Fresh and estuarine water habitat	Water bodies described in Chapter 18: Water environment
Population and human health	Chapter 9: Community, Chapter 10: Economics and employment

¹⁰ Particular species are defined as a receptor group by the 1999 DETR guidance on the assessment of major accidents to the environment. Particular species covers all species found in the UK and includes common species, red data book species and other protected or priority species.



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- 15.6.4 The list of receptors will be kept under review as more detailed information is provided through ongoing data collection in other topic areas, including ecological, archaeological and land survey work.

15.7 Likely significant effects requiring assessment

- 15.7.1 The scoping assessment considered all credible potential major accidents and disasters that could occur during the construction and operational phases of the DCO Project. Those that might be significant and warrant further assessment have been scoped into the EIA.
- 15.7.2 Due to the broad nature of potential major accidents and disasters identified, construction and/or operation of any of the components of design described in Section 3.3: Principle components of the DCO Project could potentially influence the effect of major accident or disaster. This could be as one or more of the following:
1. A source of major accident
 2. A pathway between a source of major accident or disaster and receptor
 3. A receptor.
- 15.7.3 All phases of construction and operation described in **Chapter 3: The DCO Project**, are considered.
- 15.7.4 For this reason, the approach to scoping differs slightly from other topics in that it has been carried out and reported based on hazard (i.e. the potential major accidents and disasters that could occur) rather than construction and/or operational activities.
- 15.7.5 The scoping assessment was undertaken in three stages:
1. Establishment of existing baseline - interviews with key airport operations staff were undertaken to confirm the existing baseline and establish an understanding of the interface of the DCO Project with the existing airport operations
 2. Identification of potential major accidents and disasters – potential new or altered sources of major accidents or disasters relevant to the DCO Project (for both construction and operation) were identified from information provided by key airport staff, consideration of the checklist for typical sources of major accidents and disasters (refer to **Appendix 15.4: Identification of sources of major accidents and disasters**) and a review of publicly available incident data from CAA and eMARS. Potential mitigations were also identified to help inform potential effects that could be scoped out



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3. Scope out or scope in potential major accidents and disasters (for both construction and operation) - effects deemed to be not significant were scoped out and justification documented. Effects considered to be significant, or requiring further analysis to determine whether they are significant were scoped in.
- 15.7.6 The scoping assessment has identified reasonably foreseeable major accidents and disasters. In the context of major accident hazards 'reasonably foreseeable' includes accidents that have only a remote chance of occurring as a result of the DCO Project, for example because many things have to go wrong for the hazard to be realised. Similar incidents or near misses may have occurred elsewhere therefore they are considered 'foreseeable'. They are considered because the consequences are severe.
 - 15.7.7 Broadly, this approach captures all risks which could be considered intolerable and those which can be tolerated if their residual risk is reduced to As Low As Reasonably Practicable (ALARP).
 - 15.7.8 Graphic 15.1 explains these concepts. Definitions of the terms used are provided in **Appendix 15.1: Definitions**.
 - 15.7.9 Aircraft under the control of Heathrow air traffic controllers, or on the ground at Heathrow are included in the scope of the major accidents and disasters scoping assessment. Those which are within the scope of the assessment are defined by certain phases of flight where either the consequences impact upon Heathrow directly or the cause is directly attributable to Heathrow. Departing aircraft that have completed their initial climb¹¹, or aircraft which are en route but not yet on approach¹¹, are not within the bounds of the assessment. Table 15.5 lists the phases of flight using International Civil Aviation Organisation (ICAO) terminology¹¹ and whether they are considered.
 - 15.7.10 These represent the phases that give rise to airfield specific effects relevant to major accident and disasters¹². They encompass an area that is much larger than the public safety zone (PSZ) that marks the extent around the runways at which land use constraints are applied under planning, and so are considered conservative.

¹¹ ICAO Common Taxonomy Team, Phases of Flight, 2013

<http://www.intlaviationstandards.org/Documents/PhaseofFlightDefinitions.pdf> (accessed 22 March 2018)

¹² Health and Safety Laboratory, Module 14. Operational Efficiency: Ground Risk Analysis. MSU/2015/08, 2015

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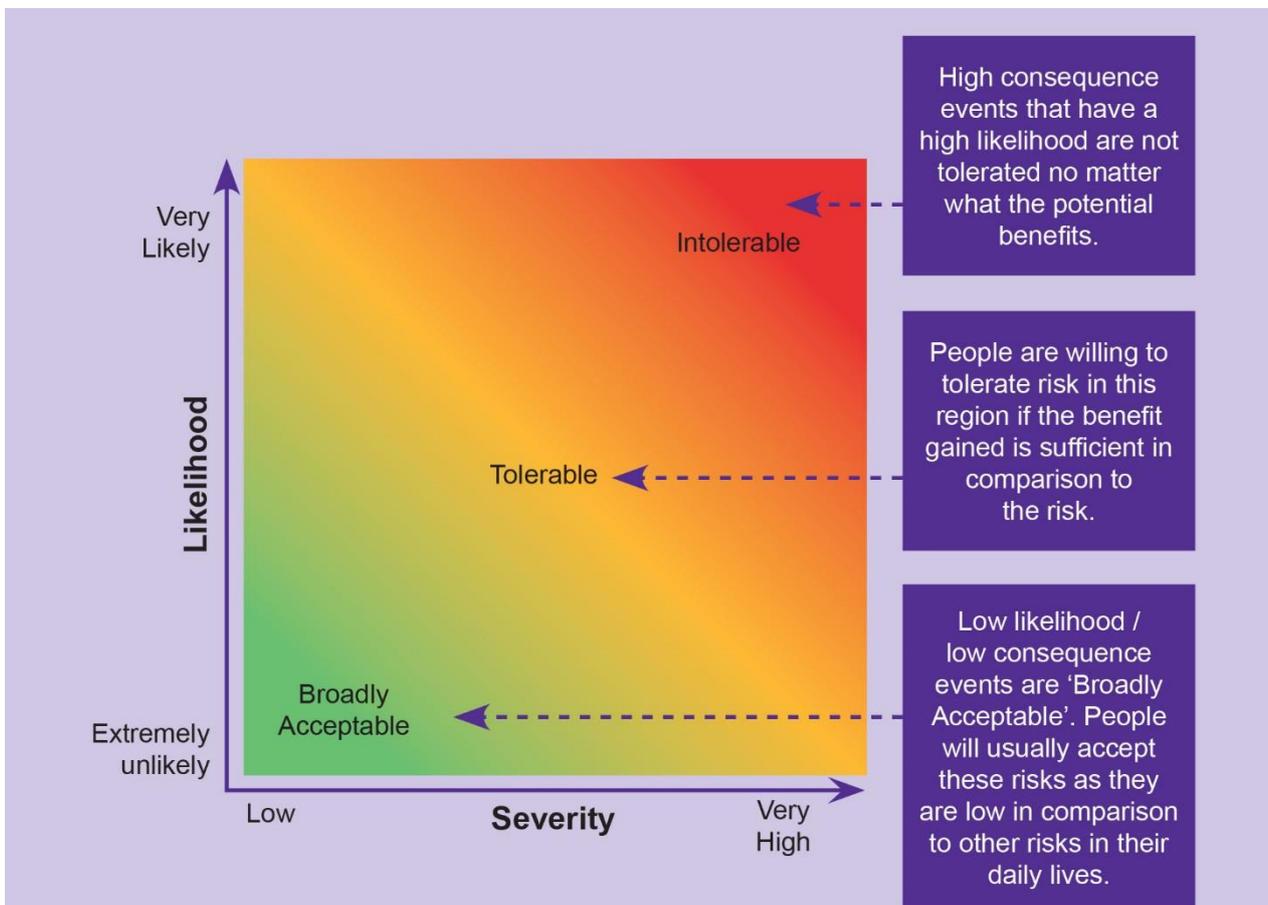
Table 15.5 Phases of flight to be considered

Flight phase	Included?	Reasoning or limitations
Standing	Yes	If departing from or landing at Heathrow.
Pushback/towing	Yes	If departing from or landing at Heathrow.
Taxi	Yes	If departing from or landing at Heathrow.
Take off	Yes	If departing from Heathrow.
Initial climb	Yes	If departing from Heathrow.
En route	No	Except aircraft intending to land at Heathrow within a holding pattern while under the control of Heathrow.
Manoeuvring (Low altitude excluding take-off and landing/ aerobatic flight operations)	No	Not anticipated at Heathrow as it relates to aerobatic flight operations or low altitude flying which is not related to a take-off or landing.
Approach	Yes	If landing at Heathrow.
Landing	Yes	If landing at Heathrow.
Emergency descent	Yes	Only if it occurs when under the control of Heathrow during approach, take-off or landing.
Uncontrolled descent	No	Except if it occurs when the aircraft is in the process of landing or taking off from Heathrow under the control of Heathrow.
Post-impact	Not Applicable	Not an expected flight stage. Used primarily in incident reporting.



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Graphic 15.1 Explanation of risk concepts used in major accident and disasters assessment



No activity is completely safe and judgements concerning whether to undertake an activity or not are made, weighing up the benefits against the potential hazards (i.e. carrying out a 'risk' assessment). Risk is a combination of the potential adverse consequences and the likelihood of those consequences arising.

Methods used for major accident and disaster assessment recognise that:

1. There is a level of risk that people view as so small as to be 'broadly acceptable'
2. At the opposite end of the scale some activities are deemed so hazardous and the risk so high that it cannot be tolerated regardless of the benefits it brings
3. In between there are some activities where the risk is not negligible, and may even be substantial, but it is tolerated because the benefits outweigh the risks.

Generally, events that have high consequences such as a large number of casualties or devastating damage to the environment are only carried out if the likelihood is extremely low. Whereas events of lower consequences (e.g. exceeding an emission standard) are tolerated at much higher frequency.

This concept is illustrated in the chart where red represents an 'intolerable' risk, green represents 'broadly acceptable' with the 'tolerable' amber area in between.

Risk tolerability isn't explicit, but is conditional based on a range of factors. These include but are not limited to:

1. Are there alternatives that are lower risk?
2. Is it cost effective to reduce the risk?
3. Is the risk equitable (i.e. is the risk borne by the person who benefits)?
4. How vulnerable / sensitive is the receptor?

Risk perception varies from person to person. The tolerability used by the regulators such as the HSE, described later in this chapter, is based on what is generally tolerable to most people.



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- 15.7.11 Major accident and disaster risks which are not reasonably foreseeable are not assessed. This applies to those where the potential consequences are so low that they cannot be considered major accidents or disasters, or where the likelihood of it occurring is sufficiently small that it can be considered unrealistic. For example, a tsunami has no realistic chance of occurring at Heathrow (due to its distance from coastal areas) and are therefore not relevant to the assessment.
- 15.7.12 The assessment of significant effects for the scoping assessment was qualitative and undertaken by competent technical experts. Effects assessed to have a substantial incremental increase in risk, and new effects of non-negligible risk contribution were scoped in for further consideration.

Scoping findings

- 15.7.13 Full results of the scoping findings are contained in **Appendix 15.5: Scoping findings** which provides:
1. A list of potential major accidents and disasters identified for construction and operation phases
 2. Conclusions as to whether the potential major accident or disaster identified should be scoped in or out of the EIA, along with the relevant justifications provided.
- 15.7.14 Reasonably foreseeable potential major accidents and disasters (for both construction and operation), including Heathrow activities and the activities of third parties (e.g. tenants, hotels, cargo handlers and airlines) require assessment except where, and for the reasons outlined, in Section 15.8.
- 15.7.15 Potential major accidents and disasters associated with the construction and operation phases of the DCO Project that require further assessment to determine if they result in likely significant effects are presented in Table 15.6.

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Table 15.6 Likely significant effects requiring assessment

Activity	Effect	Receptor
Construction		
Extreme weather (including strong winds, gales, hurricanes, storms, snow, ice hail, fog, lightning) leading to transport accident and/or overloading and damage to permanent and temporary structures and/or impairment of major accident control (e.g. County Fire Service)	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Flooding of permanent or temporary assets including construction sites leading to structural failure, floating of assets, release of hazardous material	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Drought resulting in depressed water table foundation issues leading to failure of building/asset and/or impaired firewater supply and inability to control a fire	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Fire/explosion during demolition, construction and associated transport activities	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment
Disease outbreak in surrounding area with potential for further infection outside of airport and impairment of major accident/initiator control (including fire service and policing)	Fatalities, ill health to construction workers and visitors	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport*
Release of hazardous substance/biological agent during construction that is dangerous to the environment or human life	Fatalities, injuries to people within the study area, damage to the environment	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors

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Activity	Effect	Receptor
Structural collapse / component failure of permanent or temporary structure including man-made and natural causes e.g. seismic	Fatalities, injuries to people within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment
Transport accident airside including aircraft incident or transport incident on runways, taxiways and apron that occurs during construction phase, and interfaces with construction activities (i.e. construction activities are a causal factor or influence the consequence)	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Transport accident landside including road or rail accident associated with or interacting with construction activities	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Transport accident (e.g. road or rail accident) affecting construction (i.e. construction activities are a causal factor or influence the consequence)	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Loss of external service (widespread utility failure/industrial action) resulting in failure of key mitigation measures	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors
Loss of utilities within airport leading to failure of key mitigation measures	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), surface water, ground water and land-based receptors
Industrial/urban event external to study area (e.g. fire; explosion; structural collapse, release of hazardous substance)	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport,

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Activity	Effect	Receptor
		surface water, ground water and land-based receptors
Unearthing of an historic site specific hazard (e.g. unexploded ordnance, ground contamination, landfill gas, asbestos)	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment
Emergency response hazards resulting in environmental incidents and non-aircraft safety incidents caused by incorrect action (e.g. release of contaminated firewater, firefighting foam, use of incorrect chemical, failure to act or evacuate) or equipment failure	Fatalities, injuries to people within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment
Operation		
External transport accident (e.g. road or rail accident) affecting the DCO Project	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors
External aircraft interference (e.g. birdstrike)	Fatalities, injuries and damage to property within the study area	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport*
Industrial/urban event external to study area (e.g. fire, explosion, structural collapse, release of hazardous substance)	Fatalities, injuries and damage to property within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors
Flooding of permanent or temporary assets leading to structural failure, floating of assets, release of hazardous material	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors
Extreme weather (including strong winds, gales, hurricanes, storms, snow, ice hail, fog, lightning) leading to transport accident and/or overloading and damage to	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors

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Activity	Effect	Receptor
permanent and temporary structures		
Drought resulting in depressed water table and foundation issues leading to failure of building/asset and/or impaired firewater supply and inability to control a fire	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors
Structural collapse / component failure of permanent or temporary structure including man-made and natural causes e.g. seismic	Fatalities, injuries to people within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment
Fire/explosion during airport operation	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment
Transport accident including aircraft incident on runways, taxiways and aprons	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, Surface water, ground water and land-based receptors
Transport accident airside including ground vehicle collision	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), surface water, ground water and land-based receptors
Transport accident landside road or rail accident resulting in collision and/or fire	Fatalities, injuries and damage to property within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), surface water, ground water and land-based receptors
Release of hazardous substance/biological agent during operation that is dangerous to the environment or human life	Fatalities, injuries to people within the study area, damage to the environment	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors
Unearthing of historic site-specific hazard including release of landfill gas	Fatalities, injuries to people within the study area, potential	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport,



Activity	Effect	Receptor
	for release of environmentally damaging substance	surface water, ground water and land-based receptors
Loss of utilities within airport leading to failure of key mitigation measures	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), surface water, ground water and land-based receptors
Emergency response hazards resulting in environmental incidents and safety incidents caused by incorrect action (e.g. release of contaminated firewater, firefighting foam, use of incorrect chemical, failure to act or evacuate) or equipment failure	Fatalities, injuries to people within the study area, potential release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment

15.8 Effects not requiring assessment

- 15.8.1 Potential major accidents and disasters which are assessed to be not credible, i.e. those where there is no source, pathway or receptor, or where the magnitude of damage is below the threshold of a major accident and disaster, are scoped out and are not considered further.
- 15.8.2 Elements were scoped out on one or more of the following bases for each potential major accident or disaster:
1. No source of major accident exists
 2. No receptors exist
 3. No pathway between source of major accident and receptor exists
 4. Although a source, pathway and receptor are present it is unrealistic to consider that major accident and disaster consequences could occur, even if theoretically credible
 5. The risk from the major accident or disaster considered is not measurably modified by the changes or the risk is already negligible e.g. due to low activity
 6. The risks are being assessed in another part of the EIA or another aspect of the consenting process
 7. The effects whilst meeting the definition of a major accident or disaster are not generally recognised as a major accident or disaster. For example, occupational accidents that could affect one or two workers. These risks are

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managed under the general obligations of the Health and Safety at Work Act 1974 and are not generally recognised as a major accident

8. The cause is not specific and the cause and control are external to Heathrow (i.e. Heathrow is a receptor). Although the DCO Project will change the number and locations of receptors, it is essentially 'more of the same' and the change in effect is not considered significant. An example is an outbreak of a communicable disease locally.

- 15.8.3 A list of the effects proposed to be scoped out of the major accidents and disasters assessment is provided in Table 15.7. Further detail on the reasons for proposing to scope out these effects is provided in **Appendix 15.5 Scoping findings**.

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Table 15.7 Effects to be scoped out of the major accidents and disasters assessment

Activity	Effect	Receptor	Justification for scoping out
Construction phase			
External transport accident involving aircraft not under the control of Heathrow ¹³ affects the DCO Project	Fatalities, injuries to people within the study area, damage to property	Human populations at the Airport (e.g. airport staff, public and construction staff)	The background risk of an accident involving aircraft not under control of Heathrow is low and not substantially changed by the DCO Project. Air transport activities are managed through a licensing regime and require compliance with conditions under CAA/EASA codes of practice. Facilities will extend to the DCO Project with the same quality of provision.
Structural failure caused by landslip/land movement due to natural phenomena	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), surface water, ground water and land-based receptors	No significant landslide issues due to natural phenomena identified. Change in risk is not significant in comparison to the current baseline. Current measures extend proportionally to the DCO Project with the same quality of provision.
Ash cloud, volcanic eruptions and other natural phenomenon affecting in flight safety resulting in aircraft having an impact on construction activities	Fatalities, injuries to people within the study area, damage to property	Human populations at the Airport (e.g. airport staff, public and construction staff)	Overall risk is low due to the procedures taken in events such as volcanic eruption. Change in risk is not significant in comparison to the current baseline. Current measures extend proportionally to the DCO Project with the same quality of provision. Guidance material on Volcanic Ash given in CAP 1236: Guidance regarding flight operations in the vicinity of volcanic ash, and EASA NPA 2012-07.

¹³ External aircraft are those whose flight is neither to nor from Heathrow but whose route is over the area.

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Activity	Effect	Receptor	Justification for scoping out
Malicious attack (terrorism, sabotage, vandalism or theft) including cyber-attack or widespread public disorder either within the DCO Project or external leading to effects on the DCO Project	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public and construction staff), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment	The revised draft ANPS (paragraph 4.61) states that “ <i>the Examining Authority should not need to give further consideration to the details of the security measures during examination</i> ”. Heathrow will consult with relevant security experts from the Centre for the Protection of National Infrastructure and the Department for Transport to ensure that physical, procedural and personnel security measures have been adequately considered in the design process, and that adequate consideration has been given to the management of security risks.
Event external to site resulting in release of biological agents, biohazard, disease, food and water contamination having an effect on construction	Fatalities, injuries to people within the study area	Human populations at the Airport (e.g. airport staff, public and construction staff)	The cause is not location specific and the cause and control measures are outside the scope of Heathrow (i.e. Heathrow is a receptor). Current operational measures at the airport to liaise with off-site authorities in this event will be extended proportionally to the DCO Project.
Occupational safety incidents affecting at most 1-2 workers including exposure to hazardous substances (chemical, biological radiological), physical agents, and hostile environments (confined spaces or extreme temperatures)	Fatalities, injuries to one to two workers	Construction staff	Occupational accidents that could affect 1 or 2 construction staff are scoped out. This risk is managed by safe working practices and preventative and protective measures. Under UK Health and Safety Legislation employers are required to manage the risk to their employees and others who could be affected by their activities, and to ensure that the risk is reduced So Far As Is Reasonably Practicable (also often referred to using the term As Low As Reasonably Practicable (ALARP)). This includes complying with relevant good practice as a minimum (refer to Appendix 15.2 and Appendix 15.6: Relevant guidance).

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Activity	Effect	Receptor	Justification for scoping out
Operation phase			
External transport accident involving aircraft not under the control of Heathrow ¹⁴ affects the DCO Project	Fatalities, injuries to people within the study area, damage to property	Human populations at the Airport (e.g. airport staff, public)	The background risk of an accident involving aircraft not under control of Heathrow is low and not substantially changed by the DCO Project. Air transport activities are managed through a licensing regime and require compliance with conditions under CAA/EASA codes of practice. Facilities will extend to the DCO Project with the same quality of provision.
Importation of biological agents/biohazard/disease/ pathogen including disembarkation of passengers and/or flight with controlled disease/biohazard	Fatalities, injuries to people within the study area	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport*	Considered not a significant increase over future baseline. Heathrow is an approved Border Inspection Post and provides facilities and a framework under which the Port Health Authority operate. The framework and facilities are subject to inspection by the CAA. Heathrow is a major UK airport with passenger disembarkation controls in line with UK border control requirements, working with Public Health England. The increase in the number of people and animals/animal products entering the UK via Heathrow, and the opening up of routes from new destinations will be matched by a proportionate increase in facilities aligned to the demand created by an expanded Airport. If the DCO Project were to not proceed, movements of people, animals and animal products would likely increase via other routes, therefore the change in effect of major accident and disasters resulting from the DCO Project is negligible.

¹⁴ External aircraft are those whose flight is neither to nor from Heathrow but whose route is over the area.

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Activity	Effect	Receptor	Justification for scoping out
Release/exposure to hazardous substance (chemicals/radiological/biological) during import or export due to inadequate documentation/screening	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (airport staff and public)	The risk of major accident resulting from this cause is considered negligible. Current facilities will be extended proportionally to the DCO Project with the same quality of provision. All air freight must comply with the IATA Dangerous Good Regulations.
Release of disease/biohazardous material from quarantine/ storage centres including waste and disposal	Fatalities, injuries to people within the study area	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors	The change in risk is not significant. Heathrow is an approved Border Inspection Post and provides facilities and a framework under which the Port Health Authority operates. The framework and facilities are subject to inspection by the CAA. Current facilities will be extended proportionally to the DCO Project with the same quality of provision.
Malicious attack (terrorism, sabotage, vandalism, or theft) including cyber-attack or widespread public disorder either within the DCO Project or external leading to effects on the DCO Project	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment	The revised draft ANPS (paragraph 4.61) states that “ <i>the Examining Authority should not need to give further consideration to the details of the security measures during examination</i> ”. Heathrow will consult with relevant security experts from the Centre for the Protection of National Infrastructure and the Department for Transport to ensure that physical, procedural and personnel security measures have been adequately considered in the design process, and that adequate consideration has been given to the management of security risks.

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Activity	Effect	Receptor	Justification for scoping out
External aircraft interference (lasers, fireworks or sky lanterns, drones, wind turbine interaction with radar)	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment	Appropriate systems are in place for current operations and will be extended to cover the DCO Project with the same quality of provision. No large wind turbines are located in the vicinity. Any new wind farm would be subject to planning controls, including consideration of airport safety.
Damage to artefacts of national or international importance during import or export	Damage to artefact	Historic environment (including cultural heritage)	Risk of major accident meeting the definition is already very low. Current facilities will be extended proportionally to the DCO Project with the same quality of provision. Each artefact would be subject to a risk assessment by the artefact owner and insurers.
Industrial action or loss of widespread utility failure external to site resulting in failure of key mitigation measures	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment	Heathrow implement contingency plans including where necessary a restriction on operations, in case of insufficient ground crew. This is an extension of existing arrangements. All safety and security critical systems are required to have backup power supply under CAP 168, CAP 670, and EASA CS-ADR-DSN Chapter S.
Industrial/urban event external to site resulting in release of biological agents, biohazard, disease, food and water contamination	Fatalities, injuries to people within the study area	Human populations at the Airport (e.g. Airport staff, public)	The cause is not location specific and the cause and control measures are outside scope of Heathrow (i.e. Heathrow is a receptor). Current operational measures to liaise with off-site authorities in this event will be extended proportionally to the DCO Project.

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Activity	Effect	Receptor	Justification for scoping out
Landslip/land movement due to natural phenomena	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), surface water, ground water and land-based receptors	No significant landslide issues due to natural phenomena identified. Change in risk is not significant in comparison to the current baseline. Current measures extend proportionally to the DCO Project with the same quality of provision.
Disease outbreak in surrounding area with potential for further infection beyond the airport and / or impairment of essential services (including fire service and policing) or damage to valuable species	Potential fatalities, ill health	Human populations at the Airport (e.g. airport staff, public), valuable species	Heathrow is an approved Border Inspection Post and provides facilities and a framework under which the Port Health Authority operates. The framework and facilities are subject to inspection by the CAA. Current facilities will be extended proportionally to the DCO Project with the same quality of provision. Heathrow contingency plans in case of insufficient ground crew, including where necessary a restriction on operations. This is an extension of existing arrangements. Current facilities will be extended proportionally to the DCO Project with the same quality of provision.
Ash cloud, volcanic eruptions and other natural phenomenon affecting in flight safety resulting in aircraft incident	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport, surface water, ground water and land-based receptors, built environment	Change in risk is not significant in comparison to the current baseline. Current measures extend proportionally to the DCO Project with the same quality of provision.

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Activity	Effect	Receptor	Justification for scoping out
Space weather (e.g. geomagnetic storms, radiation storms and solar flares) leads to loss of systems (e.g. loss of primary navigation system or loss of communications)	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the airport, surface water, ground water and land-based receptors, built environment	Current measures extend proportionally to the DCO Project with the same quality of provision, including considerations under the UK Government space weather preparedness strategy. Severe solar weather is also a cause of electrical power failure which has been considered in external hazards, for all causes.
Wake vortex leading to property damage	Property damage	Human populations surrounding the airport, built environment	Consequences (property damage) are below the threshold of major accident and disaster.
Occupational safety incidents affecting at most 1-2 workers including exposure to hazardous substances (chemical, biological radiological), physical agents, and hostile environments (confined spaces or extreme temperatures), falls from heights, vehicle impact during operation	Fatalities, injuries to one to two workers	Airport staff	Occupational accidents that could affect one or two staff are scoped out. This risk is managed by safe working practices and preventative and protective measures. Under UK Safety Legislation employers are required to manage the risk to their employees and others who could be affected by their activities, and to ensure that the risk is reduced So Far As Is Reasonably Practicable (also often referred to using the term As Low As Reasonably Practicable (ALARP)). This includes complying with relevant good practice as a minimum (refer to Appendix 15.2 and Appendix 15.6).
Food/water contamination due to failure of onsite monitoring, handling, control and management, including security	Fatalities, ill health	Human populations at the Airport (e.g. airport staff, public)	Procedures and standards are in place in the current Airport to manage food/water contamination related issues (e.g. regulations governing supply of potable water and Food Standards Agency requirements). Current facilities will be extended proportionally to the DCO Project with the same quality of provision.

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Activity	Effect	Receptor	Justification for scoping out
Historic site-specific hazard	Unexploded ordnance	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport	Unexploded ordnance, if present, is not expected to lead to increased major accident consequences under normal operation but presents a hazard during excavation activities so will be considered under construction only.
Loss of essential air safety and airside systems or loss of safety critical workers (e.g. due to industrial action or pandemic illness)	Fatalities, injuries to people within the study area	Human populations at the Airport (e.g. airport staff, public), human populations surrounding the Airport	Appropriate systems and contingency plans are in place for current operations in compliance with EASA licenses and CAA guidance. Existing arrangements will be extended to cover the DCO Project with the same quality of provision.
Absent or deficient safety/ environmental management systems (e.g. inadequate planning, resource provision, procedures)	Fatalities, injuries to people within the study area, potential for release of environmentally damaging substance	Human populations at the Airport (e.g. airport staff, public), surface water, ground water and land-based receptors	The current management systems will be extended and adapted to maintain current levels of effective management of safety and the environment and sufficient resources are allocated. These arrangements are subject to inspection by the CAA.
Absent or deficient security provision (e.g. inadequate planning, resource provision, procedures)	Fatalities, injuries to people within the study area	Human populations at the Airport (e.g. airport staff, public)	The revised draft ANPS (chapter 4.61) states that “ <i>the Examining Authority should not need to give further consideration to the details of the security measures during examination</i> ”. The current management systems will be extended and adapted to maintain or improve current levels of effective management of safety and the environment and sufficient resources are allocated. These arrangements are subject to inspection by the CAA.



15.9 Proposed approach to the assessment

- 15.9.1 The study area is set out in Section 15.4. This will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed. Therefore, the study area may evolve as appropriate.
- 15.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.
- 15.9.3 The identified and scoped in effects of potentially significant major accidents and disasters will undergo detailed assessment. The detailed assessment will also consider progress in the design (and embedded risk reduction measures) as well as an understanding of baseline changes which have occurred subsequent to the scoping assessment. As part of this assessment, effects previously scoped in may be eliminated (with justification), or new events may be introduced.
- 15.9.4 The assessment will consider the potentially significant major accidents and disasters that may originate:
1. Within the DCO Project that could have an effect on receptors within and/or external to the DCO Project
 2. External to the DCO Project that could have an effect on receptors within the DCO Project and/or could interact with the DCO Project so as to increase or reduce the effects on receptors external to the DCO Project.
- 15.9.5 The major accident and disasters assessment will assess effects of construction and operational activities associated with the DCO Project considering the change from current operations.
- 15.9.6 Major accidents and disasters are by their nature of very high consequences (if they occur) and are ‘unplanned’ with the effects not part of the intended design, construction or operation. The assessment of significant effects for potential major accidents and disasters focusses on the risk significance: the combination of the severity of harm (if the major accident / disaster were realised), sensitivity of the receptor and likelihood (rather than the magnitude of the change and sensitivity of the receptor only).
- 15.9.7 The proposed methodology is outlined in paragraph 15.9.18 to 15.9.49 and on Graphic 15.2. It follows established major accident and disaster risk assessment principles of hazard identification and risk ranking proportionately applied on a qualitative basis by major accident and disaster expert assessors. These principles are widely applied and are outlined in philosophies and guidance such as Reducing Risks, Protecting People: HSE’s decision making process, known as



R2P2²¹, and the HID regulatory approach¹⁵ and Chemicals and Downstream Oil Industries Forum (CDOIF) Guidelines, Environmental Risk Tolerability for COMAH sites V2 (referred to as CDOIF Guidelines in this assessment). It is also aligned to risk assessment approaches outlined in CAP795¹⁶, CAP 760¹⁷ and Control of Development in Airport Public Safety Zones (the DfT PSZ circular)¹⁸.

- 15.9.8 A limited range of options are available on which to benchmark environmental (non-human) major accident and disaster tolerability and these have mainly been developed for COMAH sites. One which is widely referenced in the UK and has been developed to support evaluation of establishments falling under the Control of Major Accident Hazard (COMAH 2015) Regulations 2015 is detailed in the CDOIF Guidelines.
- 15.9.9 CDOIF is a strategic forum established by the HSE comprising industry and regulatory bodies including the EA and HSE. The COMAH Competent Authority recommend CDOIF Guidelines for assessing major accidents to the environment. Relevant aspects are also applied to non-COMAH facilities where major accident environmental risk assessment is required (application to non-COMAH sites has been proposed by the Energy Institute¹⁹). This guidance is made use of here, as industry standard methodologies specific to airports for major accident and disaster environmental risk assessment in the UK are not available.
- 15.9.10 COMAH 2015 engages only for the fuel storage aspects of the DCO Project. However, aspects of the CDOIF Guidelines, which outline general risk assessment approaches, define major accident and disaster damage thresholds, tolerability of risk and the level at which risk from a potential accident or disaster would be considered intolerable (i.e. significant) are considered generally applicable. These specific aspects of the guidelines have been proportionately applied to develop the proposed method for the full range of relevant sources for major accidents and disaster, and the current development stage of the proposed scheme.
- 15.9.11 Risk tolerability for human receptors is long-established by the HSE and is outlined in R2P2²¹. This was developed to ensure a consistent approach to regulation of the diverse risks within the remit of the Health and Safety at Work Act 1974. It includes criteria and considerations for risk to an individual. For areas where major industrial activity is involved it also offers criteria to allow for societal concern for

¹⁵ Health and Safety Executive, HID Regulatory Model: Safety Management in Major Hazard Industries, February 2013

¹⁶ CAP 795 - Safety Management Systems (SMS) guidance for organisations - Civil Aviation Authority, 2015

¹⁷ CAP760 - Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases – Civil Aviation Authority, 2010

¹⁸ Department for Transport Circular 1/2010 Control of Development in Airport Public Safety Zones

¹⁹ Energy Institute, Guidelines on Environmental management for facilities storing bulk quantities of petroleum, petroleum and other fuels, Ed 3



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single events resulting in large numbers of casualties²⁰. The proposed tolerability criteria makes use of R2P2 alongside airport specific criteria such as that of CAP 795¹⁶ and the DfT PSZ circular¹⁸ to inform the qualitative assessment of significance, based on the application of expert judgement.

- 15.9.12 Major accident and disaster thresholds and tolerability have been qualitatively developed from the above and applied proportionately to develop the proposed method for the full range of relevant sources for major accidents and disaster, and the current development stage of the proposed scheme.

Additional baseline information required

- 15.9.13 As described in Section 15.4, should the study area change in response to the evolving design, the need for any additional baseline data for potential major accidents and disasters will be reviewed and updated.
- 15.9.14 The method will be robustly applied to third parties such as the fuel storage sites and cargo facilities within the current airport, and their operational management regimes.
- 15.9.15 Additionally, the baseline will be updated as a result of ongoing survey work undertaken by other topics.

Assessment years

- 15.9.16 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the major accidents and disasters assessment specifically.
- 15.9.17 The assessment cases relevant to the major accidents and disasters assessment are:
1. Current baseline: the existing operational two runway airport has been taken as the baseline for the assessment of potential major accidents and disasters. This includes flights under Heathrow air traffic control, and the assets and operations within the current airport boundary including those of third parties. The baseline considers that Heathrow is an international airport capable of handling all currently operating commercial aircraft and complies with ICAO, European Aviation Safety Agency (EASA) (or such regime as will replace it on

²⁰ Note that the R2P2 criteria for societal concerns consider the risk from a single industrial site to a surrounding population, involuntarily exposed to the risk and who do not derive direct benefit from the activity and are not necessarily directly applicable to other types and levels of activity due to the many factors that influence tolerability. For example it would not be appropriate to apply R2P2 criteria for events leading to multiple casualties to risk to air passengers.



the UK's exiting the EU) and CAA requirements. The current baseline has been defined as 2018

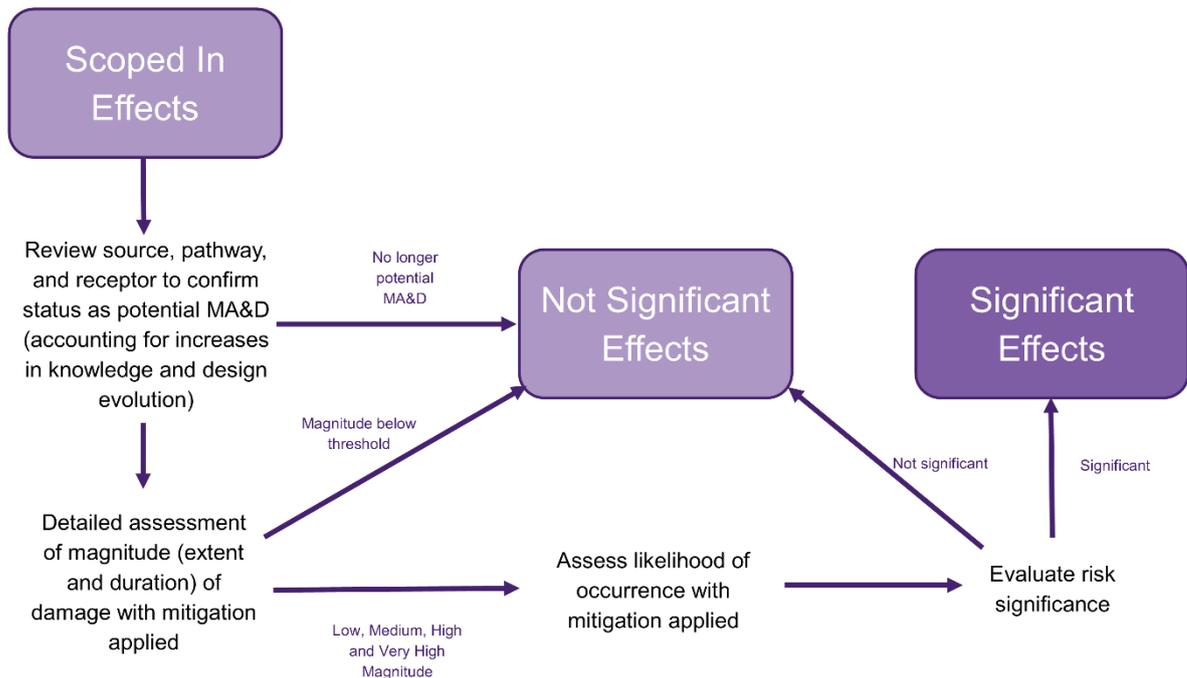
2. Future baseline: this is anticipated to be the full year of operations prior to the opening of the third runway. It is possible that the environmental conditions and the risk profile associated with operations of the two runway airport may change due to operational changes or the addition of new infrastructure from the baseline year. This will be determined as far as possible using information provided by other topics as well as information gathered from airport operations. A future baseline assumption is that travel undertaken by passengers would take place, regardless of the presence of the DCO Project by an undetermined mode of transport (e.g. road, rail, sea or other airport)
3. Construction phase: The assessment of potential major accidents and disasters during the construction phase will examine sensitivity of risk to the different construction and transition phases to identify the worst case. This will not necessarily be the same for each potential major accident / disaster scenario as different construction activities will occur at different times
4. Operations phase: this is expected to be the year of maximum ATMs
5. Maximum environmental effects cases for major accidents and disasters: The assessment of potential major accidents and disasters will consider changes in the airports risks, including where construction and operational activities overlap. The sensitivity of each major accident and disaster to changes over time will be examined and documented if significant. Examples of factors which may affect sensitivity are anticipated to be:
 - a. Climate change: increased frequency and magnitude of storms, adverse weather and other natural phenomena may affect the likelihood and severity of the consequences of natural disasters on the DCO Project
 - b. Biodiversity: changes in size and vulnerability of receptors, may affect the severity of harm and duration of damage (recovery period) from a given potential major accident and disaster.

Construction and operation assessment methodology

- 15.9.18 Graphic 15.2 outlines the approach that will be taken for the EIA. The approach is the same for both the construction and operation phases of the DCO Project.



Graphic 15.2 Detailed major accidents and disasters assessment approach



- 15.9.19 The approach to determining the significance of an effect of potential major accidents and disasters differs from the general approach described in **Chapter 4: Approach to EIA scoping** as it is risk based. Major accidents and disasters are infrequent events and so the assessment takes account of how likely the major accidents and disaster scenario is to occur, as well as the magnitude of the consequences.
- 15.9.20 In developing the approach and judgment of significance of an effect for a potential major accident or disaster, existing guidance and publications relevant to major accidents and disasters, and tolerability criteria have been used^{21,22,23,24}. Paragraphs 15.9.6-15.9.12 provided further information on how this was performed.
- 15.9.21 The potential major accidents and disasters identified during scoping will be developed into a list of specific scenarios in detailed assessment identifying potential source, pathway and receptor combinations, considering each element of the DCO Project for construction (including groundworks and demolition) and operation phases.

²¹ Health and Safety Executive, Reducing Risk Protecting People (R2P2), 2001

²² Health and Safety Executive, Environment Agency, Scottish Environmental Protection Agency, Natural Resources Wales, Office for Nuclear Regulation, All Measures Necessary – Environmental Aspects, Guidance to the Competent Authority Inspectors and Officers, April 2016

²³ The Control of Major Accident Hazards (COMAH) Regulations 2015, 2015

²⁴ Chemicals and Downstream Oil Industry Forum (CDOIF) - Guideline Environmental Risk Tolerability for COMAH Establishments, CDOIF, September 2013



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- 15.9.22 Scoped in potential major accidents and disaster sources with pathways to one or more receptors will be qualitatively assessed to evaluate whether or not the harm to the receptor(s) may be considered a significant effect. This will be achieved by:
1. Estimating the magnitude of change of an identified potential event. The pre-application stage of the DCO Project means the estimates made are qualitative and informed by expert judgement with comparison against experience in similar industries and for similar developments where this is useful and possible
 2. Comparing the magnitude of change to the thresholds which constitute a major accident or disaster. A proposed set of criteria is outlined in **Appendix 15.7: Proposed major accident and disaster harm criteria**
 3. Eliminating and documenting justifications for those effects that either have no pathway for an accident or disaster to occur, or do not meet the thresholds for a major accident or disaster
 4. Evaluating the significance, including likelihood, of remaining effects that could potentially arise from potential major accidents and disasters.
- 15.9.23 A qualitative approach for assessment of magnitude and likelihood will be used to assess risk of potential major accidents and disasters (i.e. the combination of the magnitude of change of the event and its likelihood of occurrence).
- 15.9.24 The approach starts by determining the full range of major accident and disaster outcomes and may therefore include incidents which could have catastrophic consequences but these are typically assessed as very low risk at later stages of evaluation when their likelihoods are shown to be extremely unlikely.
- 15.9.25 In assessing likelihood and magnitude, account will be taken of the risk reduction measures embedded in the design and management systems (including emergency planning and preparedness), and the effect these have in reducing risk.

Magnitude of change

- 15.9.26 Magnitude of change within the context of potential major accidents and disasters relates to both the severity of harm/damage, and either the period of time over which the receptor experiences that harm (for non-human receptors) or the number of people affected (for human receptors). Magnitude of change on receptors is assigned to one of five classes of magnitude ('very high' to 'sub major accident / disaster threshold') using Graphic 15.3 and Graphic 15.4.
- 15.9.27 For environmental (non-human) receptor types, the criteria is taken directly from the guidance issued by the Chemicals and Downstream Oil Industry Forum (CDOIF)²⁴.



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- 15.9.28 Graphic 15.3 uses the CDOIF Guidelines criteria directly. The duration criteria has been derived by the CDOIF members including the EA, applying expert judgement. In making their judgements, the CDOIF forum referred to legal requirements and technical knowledge/research, including those of the Water Framework Directive European reporting cycle, guidance of groundwater hazardous substances²⁵ and Environmental Damage Regulations Guidance²⁶. The CDOIF forum determined that for risk tolerability purposes, accidents from which the non-human environment will rapidly recover should not be categorised as a major accident based on their review of legal requirements and technical expertise.
- 15.9.29 The CDOIF duration of harm criteria is on the basis that a receptor which is able to recover quickly from an event is considered to have suffered a lesser level of harm and one which is more easily tolerated than one that does not recover, or recovers only after a very long time. This concept is recognised in the duration criteria, which takes account of the ability of the receptor to recover and the importance given to the receptor by society (i.e. its sensitivity). Duration criteria therefore differs by receptor type, and what is considered short term for one receptor type is not necessarily the same as that of another.

²⁵ Groundwater Hazardous Substances www.wfduk.org/stakeholders/mrv-work-area (accessed 30 April 2018)

²⁶ DEFRA, Environmental Damage Regulations Guidance, 2009



Graphic 15.3 Magnitude of change for potential major accidents and disasters for non-human receptors

MA&D Severity of Harm	Very Large	Sub Major Accident / Disaster threshold	High MA&D	Very High MA&D	Very High MA&D
	Large		Medium MA&D	High MA&D	Very High MA&D
	Severe		Low MA&D	Medium MA&D	High MA&D
	Noticeable				
		Short	Medium	Long	Very long
		MA&D Duration of harm for non-human receptors			

15.9.30 For human receptors the magnitude of change is categorised based on the number of people affected to provide appropriate positioning against HSE and CAA airport risk tolerability concepts such as those of HSE R2P2, CAA’s CAP 795 and the DfT PSZ circular. This is shown in Graphic 15.4.

Graphic 15.4 Magnitude of change for potential major accidents and disasters for human receptors

MA&D Severity of Harm	Very Large	High MA&D	Very High MA&D
	Large	Medium MA&D	High MA&D
	Severe	Low MA&D	Medium MA&D
	Noticeable	Sub Major Accident / Disaster threshold	
		Low to high numbers affected (10s of people)	Very high numbers affected (100s of people)
		Number of people affected	

15.9.31 The severity of harm, duration of harm and numbers of people affected are derived from Table 15.6.1, Table 15.6.2 and Table 15.6.3 in **Appendix 15.7: Proposed major accident and disaster harm criteria**, respectively.

15.9.32 The terms very high, high, medium, low and Sub Major Accident / Disaster threshold are specific only to the major accidents and disasters assessment and therefore ‘High MA&D’ in this chapter will not be the same magnitude as ‘high’ referred to in other chapters.



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- 15.9.33 The magnitude of change by which a major accident or disaster is identified is often very different from other topics. This is because the lower threshold for major accident hazard magnitude is often at the upper end of consideration in other topic chapters.

Sources

- 15.9.34 During scoping, sources of potential major accidents and disasters were identified through discussions with key airport personnel, use of a checklist²⁷ (refer to **Appendix 15.4**) and reference to relevant accident data bases. Further potential major accidents and disasters may be identified during the EIA which will be considered in the detailed assessment.

Receptors

- 15.9.35 Human receptors will be included on the following basis with reference to the study area (Section 15.4):
1. People visiting and working at the airport (during construction and operation of the DCO Project), and users and workers of the aircrafts within the study area
 2. Occupants of residential areas, community premises and commercial/ industrial premises (including any schools, hospitals, care homes, hotels and outdoor spaces where people commonly gather in large numbers or frequently) within the study area and their populations will be allowed for
 3. Users of the local road and transport network within the study area.
- 15.9.36 Environmental (non-human) receptors will be included on the following basis with reference to the study area (Section 15.4):
1. Designated land (nationally important)
 2. Designated land (internationally important)
 3. Other designated land
 4. Scarce habitat
 5. Widespread habitat (non-designated land)
 6. Widespread habitat (non-designated water)
 7. Groundwater source (drinking water)
 8. Groundwater source (non-drinking water)

²⁷ Using a checklist helps to ensure that all potential major accidents and disasters are identified.



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9. Soil sediment (as a receptor rather than pathway)
10. Built environment (designated buildings/sites)
11. Particular species
12. Marine environment
13. Fresh and estuarine water habitat.

Pathways

- 15.9.37 The pathways for harm will be determined in consideration of the assessment years, study area and identified hazard sources. Initial identification of pathways has been informed by discussions with Heathrow and DCO Project design team personnel, and reviews of DCO Project documentation.

Evaluation of significance of effect

- 15.9.38 The final stage is to assess the likelihood of an event occurring and then to determine the risk, and its significance. The significance criteria given in Graphic 15.5 is applied to the major accidents and disasters chapter only.
- 15.9.39 The significance criteria for people and the non-human environment have been developed from established methods as outlined in paragraphs 15.9.7 to 15.9.12 of this chapter. This is considered on a per effect basis rather than in terms of aggregated risk (aggregated risk is the total combined risk from all contributors from an entire facility or development to a receptor).
- 15.9.40 It is important to recognise that the magnitude of change levels referred to in Graphic 15.5 are from Graphic 15.3 and Graphic 15.4, and are calibrated to potential major accidents and disasters. The associated likelihoods from which the risk significance is evaluated are relative to the potential major accident's or disaster's scale of magnitude and in general much less likely than those covered in other topic chapters. Graphic 15.5 therefore adopts a graded approach to significance of effect, where higher magnitude events would be considered significant at a lower likelihood than lower magnitude events.
- 15.9.41 Direction provided by the European Commission²⁸ highlights that the context for inclusion of major accidents and disasters in EIA is to ensure that adequate focus is given to the provisions for events leading to significant risk with an objective of building resilience into a development against such effects, so that it and its relevant receptors are not vulnerable to significant effects from major accidents

²⁸ European Commission, Environmental Impact Assessment of Projects, Guidance on the Preparation of the Environmental Impact Assessment Report, 2017



and disasters. The bar for what should be considered significant (i.e. what can be considered to be intolerable) therefore includes infrequent effects.

- 15.9.42 The assessment first takes the severity of harm and either the duration of harm or number of people affected (depending on whether it is a human or non-human receptor) and uses this to establish a magnitude of change ranging from sub-major accident/disaster threshold to very high MA&D as shown in Graphic 15.3 and Graphic 15.4.
- 15.9.43 Next the likelihood of each event is qualitatively evaluated. Expert judgement has been used to establish the appropriate qualitative parameters for likelihood categorisation with definitions for each provided in Graphic 15.4. The likelihood categories are designed to be compatible with R2P2, CAP795 and the DfT PSZ circular for human populations and CDOIF Guidelines for environmental (non-human) tolerability.
- 15.9.44 Then the significance of each effect is evaluated by mapping the magnitude of change from Graphic 15.3 or Graphic 15.4, and the likelihood onto the evaluation matrix provided in Graphic 15.5. From this the effect is determined to be either ‘significant’ or ‘not significant’.

Graphic 15.5 Major accident and disaster significance evaluation matrix for all receptors

MA&D Magnitude	Likelihood per receptor per effect					
	Extremely remote chance of occurring	Remote chance of occurring	Very small chance of occurring*	Small chance of occurring	Chance of occurring	Reasonable chance of occurring
Refer to Graphic 15.2 and Graphic 15.3						
Very High MA&D	Not Significant	Not Significant	Significant	Significant	Significant	Significant
High MA&D	Not Significant	Not Significant	Not Significant	Significant	Significant	Significant
Medium MA&D	Not Significant	Not Significant	Not Significant	Not Significant	Significant	Significant
Low MA&D	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Significant
Sub Major Accident/ Disaster threshold	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

* Due to the devastating consequences of “Very high MA&D’s” they are considered significant, even at extremely low likelihood.

- 15.9.45 Risk tolerability for major accidents and disasters in the UK generally follows the ‘ALARP’ principle, where the onus is to eliminate significant effects (intolerable risk), and thereafter to reduce risk to the environment and people to as low as reasonably practicable (ALARP).
- 15.9.46 The assessment applies expert judgement to identify risks that are significant, once the design and procedural measures for risk reduction are applied. This includes prevention, control, emergency planning and preparedness, emergency response, and post event restoration and clean-up associated with major accidents and disasters.



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- 15.9.47 In order to avoid duplication the assessment will make use of relevant information from other work e.g. flood risk assessment and the safety assessment for the airspace change process, where available.
- 15.9.48 Other effects associated with major accidents and disasters that are not considered significant for the EIA may remain as residual risk. It is important to note that these effects, while not considered significant for EIA purposes will nonetheless require control and management during design and operation of the DCO Project, so that risk is reduced to ALARP.

Cumulative effects assessment

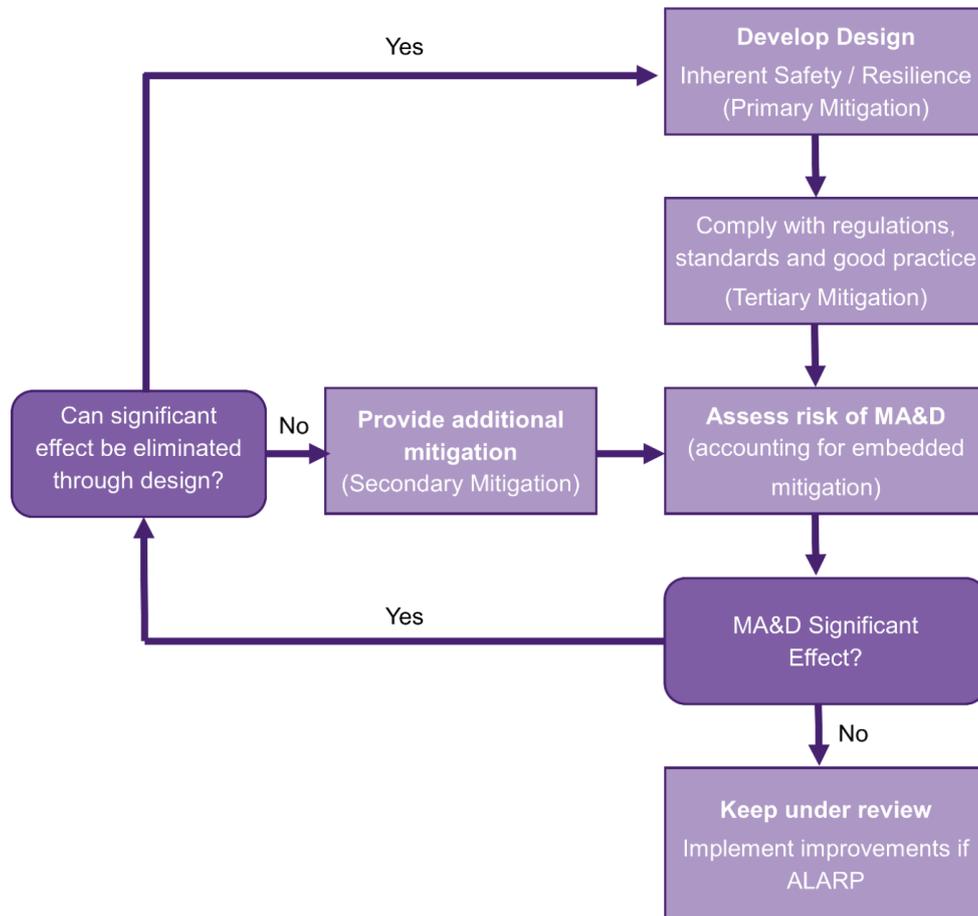
- 15.9.49 Cumulative major accident and disasters effects resulting from the interaction of effects, combined and additive, from the DCO Project and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

15.10 Approach to mitigation

- 15.10.1 During the assessment mitigation measures that would help to avoid, reduce or, where appropriate, mitigate significant negative effects of major accidents and disasters, including emergency response measures, will be identified. The approach to mitigation is an iterative one, as illustrated on Graphic 15.6.



Graphic 15.6 Approach to mitigation



15.10.2 At design stage, the inherent risk of potential major accidents and disasters is eliminated or reduced where practicable by embedded mitigation measures and best practice such as:

1. Ensuring adequate segregation between potential hazards and receptors, for example:
 - a. Prohibiting any increases in the number of people living, working or congregating within the public safety zone around the airfield²⁹, and reducing numbers where practicable
 - b. Restricting development on areas subject to flooding, if the consequences of flooding on the development are significant³⁰

²⁹ DfT Circular, Control of Development in Airport Public Safety Zones, March 2010

³⁰ Flood risk and coastal change <https://www.gov.uk/guidance/flood-risk-and-coastal-change> (accessed 16 February 2018)



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- c. Restricting development around sites that meet or exceed threshold quantities of hazardous substances and pipelines with hazardous substances³¹
 - d. Integrating potential new major accident and disaster scenarios into existing emergency response plans, including a strategy for clean-up and remediation should a major accident or disaster occur.
2. Including the risk of potential major accidents and disasters as a factor to be considered during appraisal of design options
 3. Designing the components of the development to be resilient against potential major accidents and disasters e.g. resilient against severe weather including consideration of climate change
 4. As a minimum complying with relevant Regulations, standards and good practice for design and construction so as to reduce the likelihood of failure leading to major accidents and disasters.
- 15.10.3 If after taking into account embedded mitigation and best practice a given major accident or disaster scenario presents a significant effect, an iterative approach is applied to:
1. Amend the design to eliminate or reduce the potential for major accidents or disasters; and / or
 2. Provide additional mitigation measures.
- 15.10.4 As a minimum the DCO Project will be designed, constructed and operated in accordance with relevant Health, Safety and Environmental legislation. Key regulations relevant to the mitigation of potential major accidents and disasters associated with the DCO Project are, however, included in **Appendix 15.2**.

³¹ Land Use Planning (LUP) - Public safety advice <http://www.hse.gov.uk/landuseplanning/index.htm> (accessed 16 February 2018)



Chapter 16

Noise and vibration



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16. NOISE AND VIBRATION

16.1 Introduction

- 16.1.1 This chapter describes the scope of the assessment as it relates to noise and vibration. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 16.1.2 This chapter describes:
1. The noise and vibration policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. The study area for the baseline and the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the Development Consent Order (DCO) Project on noise and vibration
 7. Effects not requiring assessment
 8. The proposed approach to the assessment
 9. Approach to mitigation.
- 16.1.3 The assessment of noise and vibration considers the likely significant effects arising from the construction and operation of the DCO Project on:
1. People, primarily where they live ('residential receptors') on an individual dwelling basis and on a community basis, including any shared community open areas¹
 2. Community facilities such as schools, hospitals, places of worship, and commercial properties such as offices and hotels, collectively described as 'non-residential receptors'

¹ 'Shared community open areas' are those that the *Planning Practice Guidance: Noise*, Department for Communities and Local Government (March 2014) identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space that is nearby e.g. park or local green space.



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3. Designated 'quiet areas'².

- 16.1.4 The assessment of likely significant effects from noise and vibration on ecological, heritage and tranquillity receptors are presented in **Chapter 6: Biodiversity**, **Chapter 11: Historic environment** and **Chapter 13: Landscape and visual** of this Scoping Report and have been informed by the technical detail presented in this chapter.
- 16.1.5 In this assessment 'sound' is used to describe the acoustic conditions that people experience as a part of their everyday lives. The assessment considers how those conditions may change through time and how sound levels and the acoustic character of community areas is likely to be modified through the introduction of the DCO Project. Noise is taken as unwanted sound and hence adverse effects are termed noise effects rather than sound effects. In line with the Control of Pollution Act 1974 (COPA 1974)³ and the Environmental Protection Act 1990 (EPA 1990)⁴, use of the term 'noise' in this assessment includes 'vibration' unless otherwise stated or vibration is considered in isolation.
- 16.1.6 In this assessment there are a number of different noise or vibration effect characteristics:
1. Negative from an increase in noise levels or positive from a decrease in noise levels caused by the DCO Project
 2. Temporary from construction or permanent from operation of the DCO Project
 3. Direct, resulting from the construction or operation of the DCO Project, and/or indirect⁵ resulting from changes in traffic patterns on existing roads or railways that result from the construction or operation of the DCO Project.
- 16.1.7 The significance criteria proposed to assess likely significant effects from noise or vibration are summarised in Section 16.10: Proposed approach to the assessment.

² 'Quiet areas' are defined as either Quiet Areas as identified under the Environmental Noise Regulations (England) 2006 (as amended) or are resources which are prized for providing tranquillity as noted in the National Planning Policy Framework (NPPF), Department for Communities and Local Government (DCLG) (March 2012) and are therefore designated as such under the relevant local plan or are designated under local plans or neighbourhood development plans as local green spaces.

³ Control of Pollution Act 1974, England, Scotland, Wales

⁴ Environmental Protection Act 1990, England, Scotland, Wales

⁵ For road and rail, the legislative context is set by the Noise Insulation Regulations 1975 (as amended) and Noise Insulation (Railways and other guided systems) Regulations 1996 under the Land Compensation Act 1973. These noise insulation regulations only apply to 'new or altered' roads and railways. The precedent set by relevant DCO consents (for example A14 Cambridge to Huntingdon Improvement Scheme) and enacted hybrid Bills (for example HS2 Phase 1) is to therefore consider noise effects resulting from changes traffic patterns on existing roads or railways as indirect effects.



16.2 Policy and legislation

- 16.2.1 This section identifies the relevant policy and legislation which has informed the scope of the assessment presented in **Chapter 16: Noise and vibration**. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is set out in Section 1.3: Policy, which should be read in conjunction with this chapter.
- 16.2.2 National policies relevant to the noise assessment methodology are detailed in Table 16.1.

Table 16.1 Policy and legislation relevant to the noise assessment

Relevant policy / legislation	Relevance to assessment
Policy – UK	
<p>Revised draft Airports National Policy Statement (revised draft ANPS), Department for Transport (DfT), October 2017⁶</p>	<p>The ANPS is to be used as the primary policy for noise in connection with this DCO Project. Due regard must have been given to national policy on aviation noise, and the relevant sections of the <i>Noise Policy Statement for England (NPSE), Department for Environment, Food and Rural Affairs (Defra), (March, 2010)⁷</i>, the <i>National Planning Policy Framework (NPPF), Department for Communities and Local Government (DCLG 2012)</i>, and the Government’s associated planning guidance on noise.</p> <p>It states that noise is a basis for refusing to grant the DCO “5.67 <i>Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:</i></p> <ol style="list-style-type: none"> 1. <i>avoid significant adverse impacts on health and quality of life</i> 2. <i>mitigate and minimise adverse impacts on health and quality of life</i> 3. <i>where possible, contribute to the improvement of health and quality of life.</i>” <p>The revised draft ANPS sets out firstly, the periods of time during construction and operation that should be considered in the noise assessment and secondly, information that should be included in the noise assessment.</p> <p>The revised draft ANPS accepts that in some instances it may not be possible at the time of the application for development consent for all aspects of the proposal to have been settled in precise detail. The revised draft ANPS explicitly states that this</p>

⁶ Department for Transport, Revised draft Airports National Policy Statement, October 2017 (DfT, 2017a)

⁷ Department for Environment, Food and Rural Affairs, Noise Policy Statement for England, March 2010 (Defra, 2010)



Relevant policy / legislation	Relevance to assessment
	<p>is relevant to the noise assessment of airborne aircraft noise: <i>“The applicant’s assessment of aircraft noise should be undertaken in accordance with the developing indicative airspace design”</i>⁸. This recognises that the noise assessment provided in support of the DCO application may have to identify the likely significant effects from airborne aircraft based on indicative flight paths. The revised draft ANPS notes that <i>“Precise flight path designs can only be defined at a later stage after detailed airspace design work has taken place”</i> and <i>“Once the design work has been completed, the airspace proposal will be subject to extensive consultation as part of the separate airspace decision making process established by the Civil Aviation Authority.”</i>⁹ Guidance for this separate consenting regime is provided by the <i>Air Navigation Guidance 2017 (ANG), DfT (October 2017)</i>¹⁰ and in the Civil Aviation Publication (CAP) 1616, <i>Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements (CAP1616), Civil Aviation Authority (CAA), December 2017</i>¹¹, in line with UK aviation / airspace policy.</p> <p>The revised draft ANPS sets out the mitigation</p> <p>(for example a noise envelope, night flight ban, runway alternation to provide predictable periods of respite and other mitigation for aircraft, road, rail and construction noise) and community compensation that should be put forward and secured as necessary to meet the aims of Government noise policy as set out at paragraph 5.67 of the revised draft ANPS (see above).</p>
<p>Noise Policy Statement for England (NPSE), Defra, March 2010</p>	<p>The NPSE sets out the long-term vision of Government noise policy: to <i>“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”</i>¹²</p> <p>The aims of the policy are <i>“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:</i></p> <ol style="list-style-type: none"> 1. <i>Avoid significant adverse impacts on health and quality of life</i> 2. <i>Mitigate and minimise adverse impacts on health and quality of life</i> 3. <i>Where possible, contribute to the improvement of health and quality of life.”</i>¹³

⁸ DfT, 2017a, 5.51.

⁹ Op. Cit., 5.49.

¹⁰ Department for Transport, Air Navigation Guidance (ANG), October 2017 (DfT, 2017b)

¹¹ Civil Aviation Authority, CAP 1616, Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, December 2017 (CAA, 2017a)

¹² Defra, 2010, page 8.

¹³ Op. Cit., page 9.



Relevant policy / legislation	Relevance to assessment
	<p>To identify “significant adverse” and “adverse” impact in line with the three aims of NPSE, the policy statement notes that “there are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organization. They are:</p> <ol style="list-style-type: none"> 4. NOEL – No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise 5. LOAEL – Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected. <p><i>Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level. SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.”¹⁴</i></p> <p>The policy states “The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.”¹⁵</p> <p>The NPSE notes that “it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”¹⁶</p>
<p>National Policy Statement for National Networks (NN NPS), DfT, December 2014¹⁷</p>	<p>Nationally significant road and rail components of the DCO Project will be examined under the NN NPS. This applies the same ‘noise test’ as the revised draft ANPS (reference 5.195 of the NN NPS) and this common ‘noise test’ is in line with the Government’s noise policy (NPSE, 2010).</p>
<p>National Planning Policy Framework (NPPF), Department for</p>	<p>The NPPF states that planning policies and decisions should “aim to:</p>

¹⁴ Op.Cit., page 8.

¹⁵ Op.Cit., page 9.

¹⁶ Op.Cit., page 9.

¹⁷ Department for Transport, National Policy Statement for National Networks, December 2014 (DfT, 2014).



Relevant policy / legislation	Relevance to assessment
<p>Communities and Local Government (DCLG), March 2012</p>	<ol style="list-style-type: none"> 1. <i>Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development</i> 2. <i>Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions</i> 3. <i>Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established</i> 4. <i>Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.</i>¹⁸ <p>The NPPF also states that “<i>The planning system should contribute to and enhance the natural and local environment by: .. preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability,</i>”¹⁹</p> <p>At the time of preparing this Scoping Report, Government is consulting on proposed revisions to the NPPF though none of the changes appear to alter the intent of the four aims noted above and additionally there is proposed new obligation on developers of new residential premises.</p>
<p>Aviation Policy Framework (APF), DfT, March 2013²⁰</p>	<p>The APF sets the framework for noise management at UK Airports that applies, as amended by the <i>Consultation Response on UK Airspace Policy</i>, DfT, October 2017²¹, until Government publishes its Aviation Strategy (at this time understood to be early 2019).</p> <p>The framework for noise management, includes:</p> <ol style="list-style-type: none"> 1. The general principle that the Government expects that future growth in aviation should ensure that

¹⁸ DCLG, 2012, page 29.

¹⁹ Op.Cit., page 26.

²⁰ Department for Transport, Aviation Policy Framework, March 2013 (DfT, 2013)

²¹ Department for Transport, Consultation Response on UK Airspace Policy: A framework for balanced decisions on the design and use of airspace, October 2017 (DfT, 2017c)



Relevant policy / legislation	Relevance to assessment
	<p>benefits are shared between the aviation industry and local communities.²²</p> <ol style="list-style-type: none"> 2. That Government fully recognises the International Civil Aviation Authority (ICAO) Assembly ‘balanced approach’ principle to aircraft noise management.²³ 3. The role of Government; to set the overall national policy framework for aviation noise and to use its powers under the Civil Aviation Act 1982²⁴ to set noise controls at specific airports which it designates for noise management purposes (which includes Heathrow).²⁵ <p>The Policy set out in the APF is to limit and, where possible, reduce the number of people in the UK significantly affected by aircraft noise, as part of a policy of sharing benefits of noise reduction with industry. This is consistent with the Government’s Noise Policy, as set out in the NPSE.</p>
<p>Consultation Response on UK Airspace Policy, DfT, October 2017</p>	<p>The Consultation Response confirms: “<i>The government has issued revised Air Navigation Directions and Air Navigation Guidance to the Civil Aviation Authority (CAA) which will take effect from 1 January 2018</i>”²⁶</p> <p>With regard to aircraft noise the Consultation Response sets out the that:</p> <ol style="list-style-type: none"> 6. “<i>The Government’s current aviation policy is set out in the Aviation Policy Framework (APF). The policies set out within this document provide an update to some of the policies on aviation noise contained within the APF and should be viewed as the current government policy.</i>” 7. “<i>Consistent with the Noise Policy Statement for England, our objectives in implementing this [UK airspace] policy are to: ... limit and, where possible, reduce the number of people in the UK significantly affected by the adverse impacts from aircraft noise.</i>” The aims of NPSE are therefore consistently applied across development consent and airspace policies. 8. “<i>We will set a LOAEL at 51 dB LAeq 16hr for daytime and based on feedback and further discussion with CAA we are making one minor change to the LOAEL night metric to be 45 dB</i>

²² DfT, 2013, 3.3.

²³ Op.Cit., 3.7.

²⁴ Civil Aviation Act 1982

²⁵ Op.Cit.,3.9.

²⁶ DfT, 2017c.



Relevant policy / legislation	Relevance to assessment
	<p><i>L_{Aeq} 8hr rather than L_{night} to be consistent with the daytime metric.”</i></p> <p><i>9. “The Government acknowledges the evidence from recent research which shows that sensitivity to aircraft noise has increased, with the same percentage of people reporting to be highly annoyed at a level of 54 dB L_{Aeq} 16hr as occurred at 57 dB L_{Aeq} 16hr in the past. The research also showed that some adverse effects of annoyance can be seen to occur down to 51 dB L_{Aeq}.”</i></p> <p>The Consultation Response also confirms the following from the APF:</p> <ol style="list-style-type: none"> 1. The Government continues to expect airport operators to offer assistance with the costs of moving to households exposed to levels of noise of 69 dB L_{Aeq,16h} or more 2. The Government also expects airport operators to offer acoustic insulation to noise sensitive buildings, such as schools and hospitals, exposed to levels of noise of 63 dB L_{Aeq,16h} or more 3. As a minimum, the Government would expect airport operators to offer financial assistance towards acoustic insulation to residential properties which experience an increase in noise of 3 dB or more which leaves them exposed to levels of noise of 63 dB L_{Aeq,16h} or more.
<p>Air Navigation Guidance 2017 (ANG), DfT, October 2017</p>	<p>ANG provides guidance to the CAA on the implementation of the changes to airspace policy which took effect from 1 January 2018.²⁷</p> <p>ANG guides the CAA, in its capacity as the decision maker for air space change, in the application of Government’s revised airspace policy.</p> <p>With regard to aircraft noise, the guidance sets:</p> <ol style="list-style-type: none"> 1. Government’s key environmental objectives, including the ‘noise objective’ “<i>to limit and, where possible, reduce the number of people in the UK significantly affected by adverse impacts from aircraft noise</i>” 2. The requirement for a CAA Environmental Statement (ES) for permanent changes to airspace design (including a detailed noise assessment)

²⁷ DfT, 2017b.



Relevant policy / legislation	Relevance to assessment
	<p>3. The need for options appraisal (including noise appraisal)</p> <p>4. The need for engagement with communities and stakeholders</p> <p>10. How the ‘noise objective’ should be interpreted:</p> <p>11. <i>“For the purpose of assessing airspace changes, the government wishes the CAA to interpret this objective to mean that the total adverse effects on people as a result of aviation noise should be limited and, where possible, reduced, rather than the absolute number of people in any particular noise contour. Adverse effects are considered to be those related to health and quality of life. There is no one threshold at which all individuals are considered to be significantly adversely affected by noise. It is possible to set a Lowest Observed Adverse Effect Level (LOAEL) that is regarded as the point at which adverse effects begin to be seen on a community basis. As noise exposure increases above this level, so will the likelihood of experiencing an adverse effect. In line with this increase in risk, the proportion of the population likely to be significantly affected can be expected to grow as the noise level increases over the LOAEL. For the purposes of assessing and comparing the noise impacts of airspace changes, the government has set a LOAEL of 51dB LAeq16hr for daytime noise and 45dB LAeq8hr for night time noise and the CAA should ensure that these metrics are considered.”</i></p> <p>12.</p> <p>13. The requirement to use WebTAG to value and compare the noise impact of airspace design options <i>“The Department for Transport’s WebTAG includes a module for valuing the impacts of noise, including those from changes in aircraft noise, on health and quality of life. It is not a comprehensive assessment of noise impacts as it is only currently possible to monetise these specific impacts based on average noise metrics. This approach does however allow decisions on transport schemes to take account of the costs and benefits of different options with regards to average noise contours in a consistent manner. The CAA must ensure that adverse effects of airspace change proposals are estimated in accordance with this methodology. Additional noise metrics should be considered, as appropriate, as specified elsewhere in this guidance, advised by the CAA, or following engagement by the sponsor.”</i></p>



Relevant policy / legislation	Relevance to assessment
	<p>14. How noise should be considered at levels of exposure below LOAEL and up to an altitude of 7,000ft (including the use of additional noise metrics)</p> <p>15. Altitude priorities</p> <p>16. The introduction of Performance Based Navigation (PBN)</p> <p>17. Guidance on designing for single or multiple routes (i.e. concentration or dispersion)</p> <p>18. The approach to designing airspace</p> <p>19. The basis for considering National Parks and Areas of Outstanding Natural Beauty</p> <p>20. The role of Independent Commission on Civil Aviation Noise (ICCAN)</p> <p>21. Guidance for the detailed management of aircraft noise</p> <p>22. Expectations for transparency on aircraft movements</p> <p>23. Specific navigational guidance including departure and arrival procedures, Continuous Descent Operations, Continuous Climb Operations, Noise Preferential Routes.</p>
<p>CAP1616 Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements (CAP1616), CAA, December 2017</p>	<p>The CAA published CAP1616 in response to the Government’s revised Air Navigation Directions and ANG on airspace policy as published in October 2017 in the Consultation Response to the UK Airspace Policy.²⁸</p>
<p>Legislation – UK</p>	
<p>Land Compensation Act (LCA) 1973</p>	<p>Provides for compensation for injurious affection associated with use of land acquired and wider diminution in property value due to noise from defined development.</p>
<p>Noise Insulation Regulations 1975 and Noise Insulation (Amendment) Regulations 1988</p>	<p>These regulations set out the duty and provisions to carry out noise insulation work or to make grants in relation to noise from new or altered roads.</p> <p>Also provides discretionary powers with regard to provide noise insulation or temporary rehousing with regard to the construction of new or altered roads.</p>

²⁸ CAA, 2017a.



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Relevant policy / legislation	Relevance to assessment
Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996	<p>These regulations set out the duty and provisions to carry out noise insulation work or to make grants in relation to noise from new or altered railways and other guided transport systems.</p> <p>Also provides discretionary powers with regard to provide noise insulation or temporary rehousing with regard to the construction of new or altered railways and other guided transport systems.</p>
Control of Pollution Act 1974	<p>Control of noise from construction sites (by local authorities).</p> <p>Definition of Best Practicable Means (BPM) and the defence against noise abatement by a local authority that BPM has been employed to minimise noise (including vibration).</p> <p>Basis for prior consent for works on construction sites including steps to minimise noise.</p> <p>Basis for defining codes of practice (applies to BS 5228: 2009+A1:2014 <i>Code of practice for noise and vibration control on construction and open sites</i>, Part 1: Noise²⁹ and Part 2: Vibration³⁰).</p>
Civil Aviation Act 1982	<p>Provides powers to set noise controls at specific airports which government designates for noise management purposes (which includes Heathrow).</p>
Environmental Protection Act 1990	<p>Definition of statutory nuisance due to noise; the duty on local authorities to investigate and abate nuisance; and defence against abatement because BPM has been employed to minimise noise (including vibration) for business premises.</p> <p>Means for a person affected by noise nuisance to seek abatement through the courts.</p> <p>With regard to statutory nuisance s79(1)(g) does not apply to noise caused by aircraft.</p>
Noise and Statutory Nuisance Act 1993	<p>Extension of powers to abate noise nuisance to a wider range of sources than the Environmental Protection Act 1990.</p>
Transport Act 2000	<p>The Transport Act 2000 provides directions to enable the Secretary of State to: a) prevent or deal with environmental noise and vibration attributable to aircraft used for the purpose of civil aviation; and b) limit or mitigate the effects of such noise, vibration, pollution or disturbance.</p>
Planning Act 2008	<p>In respect of noise nuisance, the Act confers statutory authority unless there is a provision in a granted DCO to the contrary.</p>
Localism Act 2011	<p>Basis for defining The Mayor's London Environment Strategy³¹ that must contain provisions dealing with the Mayor's policies and proposals in relation to ambient noise.</p>

²⁹ British Standards Institute (BSI), BS 5228-1: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Construction (BSI, 2014a)

³⁰ British Standards Institute (BSI), BS 5228-2: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites: Vibration (BSI, 2014b)

³¹ Currently in draft for public consultation, published by the Greater London Authority, August 2017.



Relevant policy / legislation	Relevance to assessment
	<p>Authorisation to act in relation to neighbourhood areas for the purpose of promoting or improving the social, economic and environmental wellbeing.</p>
<p>The Environmental Noise (England) Regulations 2006</p>	<p>The regulations implement the EU Environmental Noise Directive (END) 2002/49/EC³² relating to the assessment and management of environmental noise.</p> <p>The regulations set out the requirement, on a five-year cycle, to undertake strategic noise mapping and implement Noise Action Plans for agglomerations and major roads, railways and airports (including Heathrow).</p> <p>There are several Important Areas around Heathrow, which are areas that are the most exposed to road traffic noise as identified through the noise action planning process for roads carried out as required by the EU Environmental Noise Directive.</p>
<p>Legislation – EU</p>	
<p>EU Regulation 598/2014</p>	<p>This Regulation lays down, where a noise problem has been identified, rules on the process to be followed for the introduction of noise-related operating restrictions in a consistent manner on an airport-by-airport basis, so as to help improve the noise climate and to limit or reduce the number of people significantly affected by potentially harmful effects of aircraft noise, in accordance with the ICAO Balanced Approach.</p>
<p>Regulation – International</p>	
<p>International Civil Aviation Organization (ICAO)</p>	<p>The International Civil Aviation Organisation (ICAO) is a specialised agency of the United Nations, created to promote the safe and orderly development of international civil aviation throughout the world. It sets standards and recommended practices necessary for aviation safety, security, efficiency and regularity, as well as for aviation environmental protection. After a Standard is adopted it is put into effect by each ICAO member state in its own territories.</p> <p><u>Noise certification standards</u></p> <p>ICAO has set progressively tighter certification standards for noise emissions from civil aircraft. Aircraft operating in member states must conform to these standards, which are known as ‘Chapters.’ The Chapters set maximum acceptable noise levels for different aircraft at 3 specific locations during landing and take-off.</p> <p>The first aircraft noise standard, Chapter 2, was introduced in 1973 and aircraft falling in this category have been banned from operating within the EU since 1st April 2002, unless they are</p>

³² European parliament 2002 Official Journal of the European Communities. L. 189, 12-26. Directive 2002/49/EC of the European parliament and of the council of 25 June 2002 relating to the assessment & management of environmental noise, 2002



Relevant policy / legislation	Relevance to assessment
	<p>granted specific exemptions. Chapters 3, 4 and 14 categories were introduced in the years 1977, 2001 and 2013, respectively. Since 2006, all new aircraft types have had to meet the requirements of Chapter 4, which were set at 10 decibels below that of Chapter 3 (cumulative of the margins at the 3 assessment points).</p> <p>The latest noise standard Chapter 14 was agreed in 2013. This increases stringency by 7 decibels the cumulative margin relative to Chapter 4 levels and became effective (for large aircraft) from 31 December 2017. The vast majority of civil aircraft now operating fall within Chapters 4 and 14. As yet, there is no internationally agreed date for the phase-out of Chapter 3 aircraft.</p> <p><u>Balanced Approach</u></p> <p>In 2001 ICAO published the manual, A Balanced Approach to Aircraft Noise Management³³. Known as the Balanced Approach, it recommends identifying the noise problem at an airport and then analysing the various measures available to reduce noise through the exploration of four principal elements, namely:</p> <ol style="list-style-type: none"> 1. Reduction at source (quieter aircraft) 2. Land-use planning and management 3. Noise abatement operational procedures (optimising how aircraft are flown and the routes they follow to limit the noise impacts) 4. Operating restrictions (preventing certain noisier types of aircraft from flying at certain times or at any time). <p>With the goal of addressing the noise problem in the most cost-effective manner, ICAO has developed policies on each of these elements, as well as on noise charges.</p>

16.3 Stakeholder engagement

- 16.3.1 This chapter has been informed by engagement and discussion with various stakeholders. The engagement undertaken to date and proposed future engagement is detailed in Table 16.2.
- 16.3.2 It is expected that the ICCAN, as announced by the revised draft ANPS (a body being set up by the Government responsible for creating, compiling and disseminating best practice to the aviation industry), will provide independent guidance on the noise assessment, runway alternation to provide predictable periods of respite as well as Heathrow’s noise envelope framework proposals in

³³ International Civil Aviation Organization, Guidance on the Balanced Approach to Aircraft Noise Management, ICAO 9829 AMD 1, 2008



line with the revised draft ANPS. Once established, Heathrow will engage with ICCAN throughout the DCO process.

Table 16.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
<p>Heathrow Strategic Planning Group (HSPG)</p>	<p>09/11/2017 – Meeting 1</p> <ol style="list-style-type: none"> 1. Introduction to noise for the DCO Project 2. Heathrow 2.0 Sustainability Plan 3. Air Navigation Guidance 4. DCO requirement/revised draft ANPS 5. Noise Expert Review Group. <p>Key Actions/Clarifications: how the airspace change process and DCO are timed/aligned; use of worst case assumptions in noise modelling/estimation of effects; requests for noise contours to cover wider area – specifically to include South Bucks; use of quieter aircraft was raised– discussed Heathrow's current incentivisation of quieter aircraft.</p>	<p>To include:</p> <ol style="list-style-type: none"> 1. Discuss methodological approach to baseline assessment 2. Discussion with a view to reaching agreement on data, prediction and modelling approaches 3. Discussion with a view to reaching agreement on assessment scenarios 4. Discussion of mitigation options including airspace design and operating procedures 5. Identify emerging areas of common ground 6. Present initial findings of noise assessments 7. Identify and discuss potential noise effects 8. Further examine potential mitigation measures 9. Identify areas of agreement and disagreement through statements of common ground.
	<p>05/12/2017 – Meeting 2</p> <ol style="list-style-type: none"> 1. General introduction to the airspace change programme, the DCO programme, and the noise and health evidence review 2. Key issues discussed included the interface between the airspace change programme and DCO programme; how the environmental assessment is undertaken including 'worst-case assumptions'; noise in outside space for sports groups; noise in school including in classrooms with and without windows open; appropriate metrics for school assessments including $L_{Aeq,8am-3pm}$ metrics 	



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>3. Key actions/clarifications arising included issuing an invite to the airspace change team to come and talk at the next meeting; agreement for the Noise IDT to undertake work comparing $L_{Aeq,16h}$ and $L_{Aeq,8am-3pm}$ metrics for school environments; agreement that the noise assessment includes effects on outside ‘amenity’. It was discussed that the noise assessment considers external noise exposures for classrooms, but that the school insulation scheme includes ventilation, therefore removing the need for windows to be opened and would be compliant with Building Bulletin 93³⁴ which governs the acoustic design of classrooms.</p> <p>08/02/2018 – Meeting 3</p> <ol style="list-style-type: none"> 1. Discussed the developing assessment methodology for noise; consultation materials; and engaged with the sound demonstration. 2. Key issues discussed included the consultation materials for noise; study areas for the different noise sources; night-flights; the insulation scheme for schools and homes; and effects on use of outdoor space in schools 3. Highlighted need for consultation with schools (refer to Table 16.2); need for consultation materials to use lay-language; need to further communicate current 	

³⁴ Department of Education, Building Bulletin 93. Acoustic design of schools: performance standards, February 2015



Consultee	Engagement undertaken to date	Proposed future engagement
	<p>night-flight regime to local communities; need to include construction noise effects across a wide-study area.</p>	
<p>Non HSPG local authorities</p>		<p>Introductory workshop</p> <ol style="list-style-type: none"> 1. Familiarise EHPs with the proposals 2. Agree agendas and scheduling for meetings 3. Familiarise all participants with technical terminology 4. DCO/ACP interface 5. Approach to baseline. <p>Later workshop(s)</p> <ol style="list-style-type: none"> 1. Discussion with a view to reaching agreement on data, prediction and modelling approaches 2. General overview on the evidence of health effects 3. EIA methodologies 4. Discussion with a view to reaching agreement on assessment scenarios 5. Provide a channel for feedback on particular issues of concern for each authority 6. Discussion of mitigation options including airspace design and operating procedures 7. Sound demonstrations used to represent the environment around the 51 dB $L_{Aeq,16hr}$ contour and the effects of different mitigation options 8. Receive initial feedback on the proposals and mitigation options 9. Identify emerging areas of common ground. <p>Final workshop(s)</p> <ol style="list-style-type: none"> 1. Present initial findings of noise assessments 2. Identify and discuss potential noise effects 3. Further examine potential mitigation measures



Consultee	Engagement undertaken to date	Proposed future engagement
Community	<p>Sound demonstrations have been made available to stakeholders and the general public throughout the consultation period as part of Heathrow’s ongoing commitment to stakeholder and community engagement. The purpose is to enable listeners to form a personal opinion about what individual aircraft may sound like with various potential operational scenarios. These sound demonstrations enable stakeholders to judge for themselves the sound of individual aircraft and how changes such as modification to aircraft operations or flight paths and noise insulation packages could change the sound environment arising from aircraft using the airport. The sound demonstrations have been developed primarily for use in a dedicated facility at Heathrow Academy in which they are listened to over headphones.</p>	<p>4. Recognise areas of common ground and those needing further examination.</p> <p>We are planning to continue to offer sound demonstrations to support our engagement and consultation activities.</p>
Schools	<p>Visits to schools in the local area around Heathrow have been carried out or are scheduled March – May 2018 to discuss the DCO Project with schools. Discussions have covered the schools’ experience of the Heathrow Community Buildings Insulation Scheme, as well sharing information about the DCO Project and the noise and health assessment.</p>	<p>Ongoing throughout DCO application process. Schools in the local area around Heathrow will be acoustically surveyed to provide information relating to existing conditions. This will inform the noise and health assessment and mitigation.</p>

16.4 Study areas

16.4.1 This section sets out the study areas for the noise and vibration assessment for the construction and operation phases of the DCO Project. As the design and consultation processes progress and the DCO Project is refined, the study areas



may evolve to accommodate changes that are generated. If the study areas change, data collection will also be reviewed and updated.

Construction noise

- 16.4.2 The construction noise assessment study areas for the different sources of noise are defined as:
1. Noise from construction sites: up to 300m from any construction activity
 2. Noise from construction traffic on existing roads and railways will be studied where the increase or decrease in road or rail traffic volumes or traffic types caused by the construction of the DCO Project would be likely to cause a change in noise level (equivalent continuous sound level, $L_{Aeq,T}$) exceeding 1 dB during either the day (07:00 to 23:00) or night time periods (23:00 to 07:00)
 3. Vibration from construction sites: up to 100m from any construction activity.
- 16.4.3 The study areas are based on experience from recent major infrastructure projects including the Thames Tideway Tunnel, the A14 Cambridge to Huntingdon Improvement Scheme, High Speed 2 (Phases 1 and 2a) and Crossrail.
- 16.4.4 If the initial noise assessments, considering reasonably foreseeable worst-case assumptions, identify that likely significant effects could occur outside of the study areas defined above, the study areas will be revised to ensure that the areas are larger than the area where the forecast exposure exceeds the relevant LOAEL (i.e. the onset of adverse effects).

Operational noise

- 16.4.5 The operational noise assessment study areas for the different sources of noise are defined as:
1. Aircraft noise (including helicopters): Using the risk-based approach required by ANG³⁵ the area where, in normal circumstances, aircraft would be considered to operate below 4,000ft. ANG indicates “*Below 4,000 feet, there is a strong likelihood that aircraft could create levels of noise exposure above the LOAELs identified above, which is reflected in the Altitude Based Priorities*”. Based on consideration of today’s operation and our current understanding of the future operation this results in an area of approximately 40 nautical miles west-east and approximately 20 nautical miles north-south, centred on the airport. If through assessment it is found that the LOAELs extend beyond this

³⁵ Taking account of paragraph 3.9 of ANG which states “*At and above 4,000 feet, aircraft are unlikely to result in noise exposure above 51dB LAeq16hr for day time noise and 45dB LAeq8hr for night time noise*”. Where 51dB $L_{Aeq,16hr}$ and 45dB $L_{Aeq,8hr}$ are the relevant LOAELs for day and night aircraft noise respectively.



area for any indicative airspace design the study area will be extended accordingly

2. Aircraft ground and airfield noise: up to 1km from any ground operations
3. Road and / or rail traffic on new or altered roads or railways that form part of the DCO Project (direct effects): the same approach is used for roads and railways, based on the *Design Manual for Roads and Bridges (DMRB), HD213/11, Volume 11, Section 3, Part 7*, The Highways Agency, (revised November 2011)³⁶. The study area is defined as 600m around new or altered highways.
4. Changes in traffic on existing roads and railways (indirect effects) will be studied on roads and railways where the increase or decrease in road or rail traffic volumes or traffic types caused by the operation of the DCO Project would be likely to cause a change in noise level (equivalent continuous sound level, $L_{Aeq,T}$) from that road or rail traffic exceeding 1dB during either the day (07:00 to 23:00) or night time periods (23:00 to 07:00)
5. Operational vibration: based on experience from recent major infrastructure projects including High Speed 2 (Phases 1 and 2a) and Crossrail, up to a distance of 85m from any operational activity forecast to give rise to appreciable vibration.

16.4.6 If initial noise assessments considering reasonably foreseeable worst-case assumptions identify that likely significant effects could occur outside of the defined study areas, the study areas will be revised so that the areas are larger than the area where the forecast exposure exceeds the relevant LOAEL (i.e. the onset of potential likely significant effects).

16.5 Sources of data used for scoping

16.5.1 Scoping of the noise and vibration section has been based upon the emerging masterplan described **Chapter 3: The DCO Project**.

16.5.2 The assessment methodologies presented in this chapter have been developed so that they are relevant for all of the masterplan design options, and their components described in **Chapter 3: The DCO Project**, and all air space design options.

³⁶ Highways England, Design Manual for Roads and Bridges, Noise and Vibration Volume 11, Section 3, Part 7, revised November 2011 (Highways England, 2011).



16.6 Baseline conditions

- 16.6.1 This section describes the existing baseline conditions around Heathrow.
- 16.6.2 The ongoing process of baseline data collection that will support the noise assessments is described in sub-section “Approach to gathering baseline data”, below.
- 16.6.3 The existing operation of Heathrow is described in **Chapter 2: Description of the existing site and its surroundings**. As a result of its operation, airport related development and access to major transport modes, existing receptors in the area are currently exposed to varying levels of noise from the following sources:
1. Aircraft noise (including helicopters)
 2. Aircraft ground and airfield noise
 3. Road traffic noise
 4. Railway noise
 5. Noise from other sources such as industry in the vicinity of Heathrow.

Description of current operation

- 16.6.4 Heathrow is the busiest airport in the UK with approximately 650 arrivals and 650 departures every day. In 2016, the airport handled approximately 76 million passengers and 475,000 Air Transport Movements (ATMs). The ATMs are capped by a planning condition on the Terminal 5 planning permission and Heathrow would require a further planning permission or development consent to raise the cap.
- 16.6.5 The Airport is located in the London Borough of Hillingdon, approximately 21km west of Central London and has an operational area that covers approximately 10km².
- 16.6.6 The Airport has two runways - the northern runway (runway 09L during easterly operations and 27R during westerly operations) and the Southern runway (runway 09R during easterly operations and 27L during westerly operations), which run in an approximately east-west direction, four passenger terminals and one dedicated cargo facility.
- 16.6.7 The Airport can operate 24 hours per day, however there are restrictions on night time (23:00 to 07:00) operations put in place by the UK Government. In particular,



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there are limits on the number and types of aircraft that can operate between 23:30 and 06:00 across the summer and winter seasons³⁷.

- 16.6.8 The areas to the north, south and east of Heathrow are surrounded by a mix of residential areas, industrial units and commercial uses, but predominantly residential land. The west of the Airport is surrounded by large open spaces including three reservoirs, industrial units and residential areas.

Aircraft noise

- 16.6.9 Heathrow is a major airport for the purposes of the Environmental Noise (England) Regulations³⁸, as amended.
- 16.6.10 The most recent noise exposure data available for Heathrow is that for 2016 and is published in ERCD REPORT 1701: *Heathrow Airport 2016 Summer Noise Contours and Noise Action Plan Contours*, CAA (November 2017)³⁹. That report indicates the following noise exposure statistics as a result of current operation:
1. Daytime summer standard – noise level exceeding 54 dB L_{Aeq, 16hr}
 - a) Area: 184.2 km²
 - b) Population: 588.8 thousand
 - c) Households: 240.9 thousand
 2. Night-time summer – noise level exceeding 48 dB L_{Aeq, 8hr}
 - a) Area: 115.4 km²
 - b) Population: 437.9 thousand
 - c) Households: 181.8 thousand.

These noise metrics presented above for daytime summer standard and the night-time summer standard are consistent with current policy but are different to the latest LOAEL values of 51 dB L_{Aeq, 16hr} and 45 dB L_{Aeq, 8hr} set out the latest guidance (the Consultation Response to UK Airspace Policy⁴⁰ and UK Air

³⁷ The Government has historically set restrictions on the operation of aircraft at night. Currently a night Quota period of 6.5 hours is in operation from 23.30 until 06.00 hours at Heathrow, which limits the overall number of night flights; places restrictions on the noisiest aircraft types; and sets noise quotas which cap the amount of noise energy which can be emitted at night over the course of the regime. Department for Transport, Night Flying Restrictions at Heathrow, Gatwick and Stansted (DfT, 2017d)

³⁸ The Environmental Noise (England) Regulations 2006

³⁹ CAA, ERCD REPORT 1701: Heathrow Airport 2016 Summer Noise Contours and Noise Action Plan Contours, November 2017 (CAA, 2017b)

⁴⁰ Department for Transport, UK Airspace Policy: a framework for the design and use of airspace, 2017



Navigation Regulations⁴¹). The UK Government does not currently present exposure statistics to these values.

- 16.6.11 The are many operational factors which define the current aircraft noise baseline including westerly and easterly operations, ‘westerly preference’, runway alternation, the location of the four main ‘holding stacks’, the point at which aircraft join the final approach, departure routes and restrictions on night flights⁴² These operational parameters are described in more detail in Appendix 16.1: Description of current aircraft operation. To accord with the revised draft ANPS changes may be required to these current operational parameters.
- 16.6.12 A range of aircraft noise metrics are published to meet the requirements of Heathrow’s Airport Noise Action Plan . The most recent data provide Heathrow 2016 average summer 16-hour day and 8-hour night LAeq contours, as well as 2016 annual Lday, Levening, Lnight, Lden and LAeq, 6.5hr night noise contours and supplementary metrics including N65 and N70 annual 16-hour day contours and N60 annual 8-hour night contours.
- 16.6.13 Heathrow, working with local community representatives, have developed a noise monitoring programme which aims to provide more detailed information for specific areas around the airport. Different locations are selected annually, and a series of reports are produced and published . The latest reports are presented in a new format developed in conjunction with members of the Heathrow Community Noise Forum (HCNF). These Community Information Reports use a range of metrics that are simple and clear for those without a technical knowledge, and better reflect people’s experience of aircraft noise. Currently Community Information Reports for Ascot, Bishopsgate, National Physics Laboratory Teddington, and Strawberry Hill House Twickenham are available on the Heathrow website. Previous Community Noise and Track Keeping reports from Barnes, Brockley, Burhill, Chertsey, Feltham, Ham Island, Hendon, Holyport, Ickenham, Mogden, Teddington, Thorney, and Windsor Great Park are available on the Heathrow website.
- 16.6.14 The Heathrow website also provides several map-based tools that give local residents and communities information, including noise levels, about planes using Heathrow’s flight paths . xPlane provides address-specific information to residents about what planes flew over them, when and how often, providing residents with information about the numbers, heights, position and types of aircraft over their property. Webtrak provides address-specific information about individual planes as they take off or land at Heathrow detailing the type of plane, height, origin and destination of the flight, as well as the noise levels recorded for that flight. Webtrak can look at specific flights over different day and time periods. It has recently started to display information on how well aircraft stay within Heathrow’s departure

⁴¹ Department for Transport, Air Navigation Guidance, 2017

⁴² Department for Transport, Night Flying Restrictions at Heathrow, Gatwick and Stansted (DfT, 2017d)



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routes up to 4,000ft. Webtrak 'My Neighbourhood' provides address-specific information about the flight paths at Heathrow, providing detail about where aircraft fly at Heathrow and how particular flight paths are generally used on a monthly, quarterly, or yearly basis. The flight data for Webtrak and Webtrak 'My Neighbourhood' is taken directly from the National Air Traffic Services radar that is used to direct aircraft into Heathrow. The accuracy of the Webtrak system has been verified by the Civil Aviation Authority and of the Webtrak 'My Neighbourhood' has been verified by the Civil Aviation Authority and the independent NLR company (NL).

Aircraft ground and airfield noise

- 16.6.15 For areas in the immediate vicinity of the Airport, noise from the airfield and aircraft operating on the ground also contributes to the baseline noise environment. These receptors are typically located close to areas where aircraft ground movements take place, for example near to taxiways, runway hold and exit points, engine testing facilities and parking stands. Ground noise is likely to be noticeable at the airport boundary and in surrounding areas of Sipson, Harmondsworth, Harlington Cranford, Hatton, East Bedfont, West Bedfont, Stanwell, Stanwell Moor and Longford.

Road traffic noise

- 16.6.16 Major sources of road traffic noise are located within the vicinity of Heathrow. Road traffic noise sources include the M4 and M25 motorways, the A4 spurs, other major A-roads and many local roads. These road networks form the primary routes for airport traffic. Recent road traffic noise studies for the Airport indicate road traffic noise is likely to be audible at most locations surrounding the Airport. Many of the roads within the study area are regarded as a major source of road traffic noise (known as important areas under the Environmental Noise (England) Regulations) 2006.

Railway noise

- 16.6.17 The Airport is also served by a number of overground railways (for example, existing rail operations on the Colnbrook railway line) and underground railways. Railway noise maps prepared by Defra for the Round 2 Noise Action Plan in 2011 show that rail noise is likely to be audible in communities in the proximity of the Piccadilly line, the Heathrow Express and Southern and Western Rail access routes.



Noise Important Areas

16.6.18 Noise Important Areas⁴³ (NIA) in the vicinity of the DCO Project resulting from existing roads and railways have been defined from the noise mapping exercise undertaken under the requirements of the Environmental Noise (England) Regulations 2006 that implement the END. Any opportunities that the DCO Project may provide to reduce noise levels will be considered in the context of any steps that are being taken by Highways England and other highway competent authorities as part of the *Noise Action Plan: Roads*⁴⁴ and by Network Rail as part of the *Noise Action Plan for Railways*⁴⁵.

Other sources of noise

16.6.19 Other noise sources in the area around the Airport have localised effects and include noise generated from the operation of the Lakeside ‘Energy from Waste’ Plant in Colnbrook (adjacent to the M25 motorway); other local industrial buildings; and airport maintenance facilities located at the eastern end of the airfield.

Approach to gathering baseline data

- 16.6.20 Baseline information will be obtained in three rounds of data gathering exercises; This is explained in more details in paragraphs 16.6.23 to 16.6.27.
- 16.6.21 Each round of baseline data collection will gather data both in terms of baseline noise levels (using a range of metrics) and acoustic character.
- 16.6.22 Baseline data will be gathered across the study area for aircraft noise (refer to Section 16.4: Study areas) which encompasses the study areas for all the road and rail proposals, as well as other noise sources.

Noise

16.6.23 The information used to define the baseline will be obtained in three rounds of data gathering exercises. Round 1 will gather information from a variety of existing sources to inform the baseline across the aircraft noise study area. This information will be reviewed to identify locations requiring further assessment because there is a lack of existing information, or where more detailed information is required. These areas will be subject to baseline data gathering exercises of increasing detail in Rounds 2 and 3.

⁴³ Important Areas are identified with respect to noise from major railways where the top 1% of the population that are affected by the highest noise levels from major roads and railway are located according to the results of the strategic noise mapping undertaken as part of the END.

⁴⁴ Department for the Environment, Food and Rural Affairs, *Noise Action Plan: Roads (Including Major Roads)*, January 2014 (DfT, 2014a)

⁴⁵ Department for the Environment, Food and Rural Affairs, *Noise Action Plan: Railways (Including Major Railways)*, January 2014 (DfT, 2014b)



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- 16.6.24 Round 1 baseline data collection comprises publicly available measurement and prediction data such as:
1. Noise monitoring undertaken by Heathrow
 2. Noise surveys undertaken for related and unrelated planning applications in the area
 3. Aircraft noise contours published by the UK Government for Heathrow
 4. Noise mapping for noise mapping published as required by the Environmental Noise (England) Regulations 2006 for the London agglomeration, Heathrow, major roads and major railways.
- 16.6.25 The data sources used for Round 1 baseline collection are set out in Table 16.3.
- 16.6.26 For Round 2 baseline, any major sources of sound, not already covered by Round 1, will be modelled where practicable. The Round 2 calculations will be verified by targeted noise measurements. The sources to be modelled will include, industrial, aircraft, road and rail. Combined with the Round 1 Baseline, these data obtained from noise modelling will form the Round 2 Baseline. The modelling in Round 2 will be supplemented by noise source data, historic measurement data and new measurements as appropriate. Round 1 and Round 2 baseline information will inform the noise assessment presented in the PEIR.
- 16.6.27 For the Round 3 baseline, noise monitoring will be undertaken in locations where either:
3. 1. The indicative airspace design (or designs) and the airspace design envelope available at the time indicate areas which could be ‘newly overflowed’
 4. 2. Response to the consultation on the PEIR has identified new information
 5. 3. Where no robust or relevant baseline data is available at Rounds 1 and 2.
- 16.6.28 In addition to obtaining objective baseline sound level data, the acoustic environment will be characterised during the noise monitoring through measurements of noise from specific sources within the environment, observations of relative contribution of noise sources to the environment and a subjective commentary on the prevailing noise environment. The format and methodology of noise surveys will be reviewed by the Noise Expert Review Group (NERG) and agreement sought with the relevant Environmental Health representatives for the Local Authorities. The Round 3 Baseline will inform the assessment presented in the ES.
- 16.6.29 Locations for further monitoring in Rounds 2 and 3 will be determined through an approach reviewed by NERG and detailed consultation with local authorities taking



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into account data from fixed monitoring locations and future mobile monitoring locations.

- 16.6.30 Baseline data gathering will be undertaken during Round 2 and Round 3 at noise sensitive non-residential receptors on a case by case basis based on the screening approach for non-residential receptors set out in Section 16.10.

Vibration

- 16.6.31 It is expected that there will be no appreciable vibration across the majority of the study area because appreciable levels of vibration would only be expected close to some existing railways. As noted later in this chapter potential effects arising from the DCO Project are only likely during and close to certain construction activities and potentially close to new or altered railways associated with the DCO Project. Further, in line with best practice, likely significant effects from vibration will be assessed on a worst-case basis at all relevant receptors against specific absolute thresholds, below which receptors will not be affected by vibration.
- 16.6.32 On the above basis, vibration baseline data gathering will be limited. The exception will be for any highly vibration sensitive receptors, such as research facilities, which are identified during the assessment. Should such facilities be identified, the approach to vibration baseline data gathering would be determined on a case by case basis depending on the type and use of receptor.

Table 16.3 Round 1 baseline data sources

Origin	Title	Dates	Content and metrics
Heathrow Modelling (Environmental Research and Consultancy Department (ERCD), CAA)	Noise Action Plan and Noise Action Plan Contours for Heathrow	From 2006, latest 2016	<p><i>ERCD Report 1701</i>⁴⁶. presents Heathrow 2016 'average summers day' 16-hour daytime and 8-hour night-time noise contours, expressed as $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ respectively.</p> <p>The report also presents noise contours which have been produced for the purposes of the Heathrow's Environmental Noise Directive Round 2 Noise Action Plan 2013-2018⁴⁷, including annual L_{day}, $L_{evening}$, L_{night}, L_{den} and $L_{Aeq,6.5hr}$ night contours, in addition to supplementary metrics including N65 day, N70 day and N60 night contours.</p>

⁴⁶ CAA, 2017d.

⁴⁷ Heathrow Airport Limited, Heathrow's Environmental Noise Directive Round 2 Noise Action Plan 2013-2018, August 2014



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Origin	Title	Dates	Content and metrics
			The ECRD report also presents noise contours which have been produced for the purposes of the Heathrow's Environmental Noise Directive Round 2 Noise Action Plan 2013-2018 L_{den} , L_{night} .
Community monitoring (LHR Airports Ltd)⁴⁸	Heathrow Fixed and Mobile Noise Monitoring data	2007 onwards	L_{Aeq} , L_{Amax} , L_{A90} , L_{A10}
Community monitoring (LHR Airports Ltd)⁴⁹	Heathrow WebTrak	2008 onwards	Instantaneous Sound Pressure Level, historic data for previous 12 months
Community monitoring (LHR Airports Ltd)	Heathrow Community Reports	Annual from 2014	$L_{Aeq,T}$, $L_{A90,T}$, L_{Amax} for aircraft passes
3rd Runway Noise Assessment (Amec Environment & Infrastructure Ltd)⁵⁰	Air and Ground Noise Assessment	June 2014	Short-term attended $L_{Aeq,T}$ and $L_{A90,T}$ measurements at specific points
Questionnaire (CAA)	Survey of Noise Attitudes (SoNA 2014) ⁵¹	October 2014- February 2015	Survey responses
Strategic Mapping (Defra)⁵²	England Noise Map ⁵³	2012	Modelled $L_{Aeq,16h}$, L_{night} for road and rail sources
EIA (Crossrail/RPS)	Crossrail Baseline Noise Monitoring ⁵⁴	July 2003 - October 2004	$L_{Aeq,1hr}$, $L_{A90,1hr}$, $L_{A10,1hr}$ $L_{Amax,1hr}$ long and short-term monitoring at specific points
Local Authority Planning Portals	Various noise survey reports for planning applications within the study area	Various	Various

⁴⁸ Reports available from: Community Noise Reports <https://www.heathrow.com/noise/reports-and-statistics/reports/community-noise-reports> (accessed 15 May 2018)

⁴⁹ Tracking available at: Track flights on maps <https://www.heathrow.com/noise/what-you-can-do/track-flights-on-maps> (accessed 15 May 2018)

⁵⁰ Amec, Heathrow's North-west Runway: Air and Ground Noise Assessment, June 2014

⁵¹ Civil Aviation Authority, CAP 1506: Survey of Noise Attitudes 2014: Aircraft, February 2017 (CAA, 2017d)

⁵² This data will be updated to take into account the latest strategic noise mapping published by Defra.

⁵³ England Noise Map Viewer <http://www.extrium.co.uk/noiseviewer.html> (accessed 15 May 2018)

⁵⁴ Monitoring data available online at <http://www.crossrail.co.uk/about-us/crossrail-bill-supporting-documents/specialist-technical-reports/noise-vibration?folder=/10/362/asset/2170> (accessed 15 May 2018)



Origin	Title	Dates	Content and metrics
Local Plans & Neighbourhood Development Plans		Various	Various

16.7 Assumptions and limitations

Construction

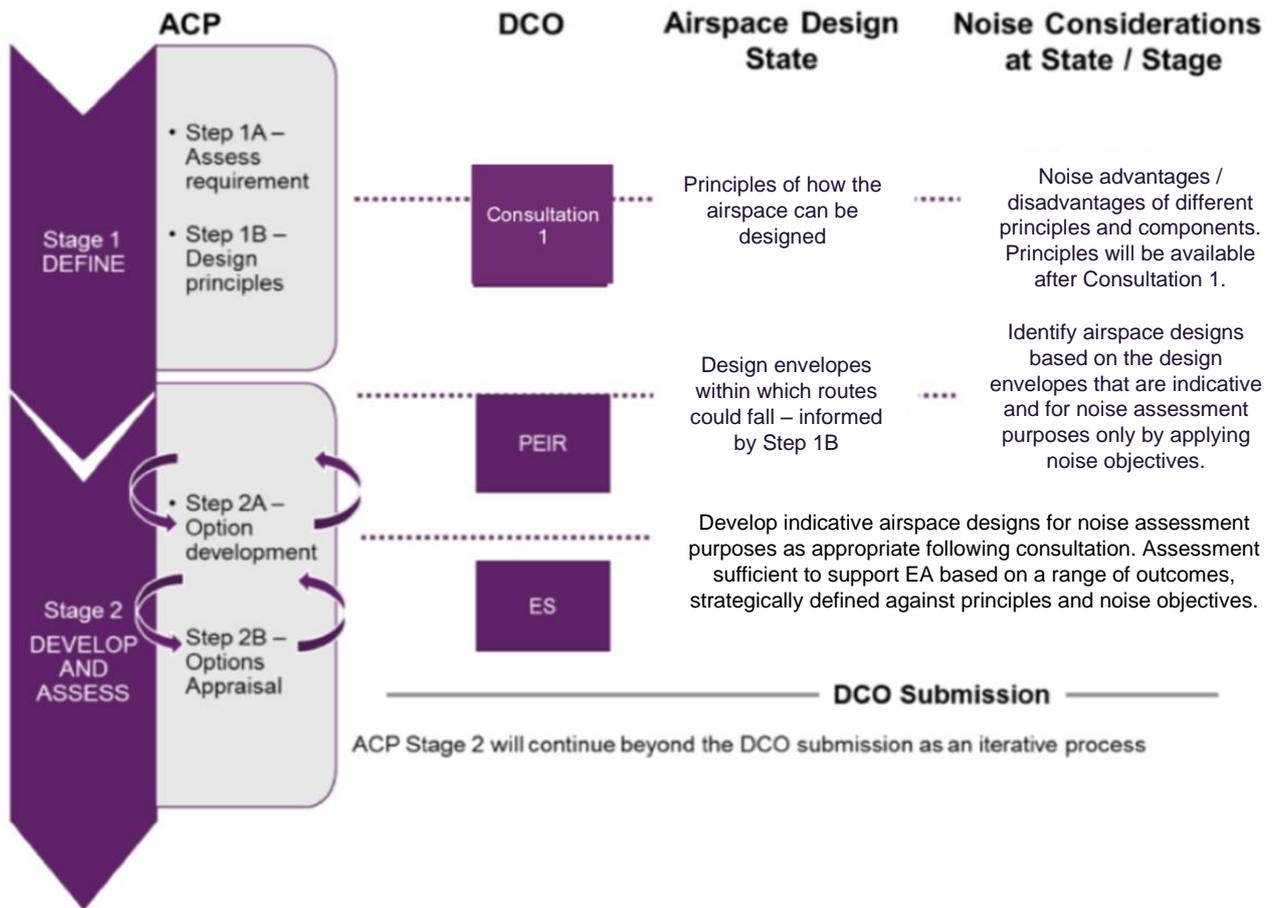
- 16.7.1 Construction noise predictions will be based on the anticipated programme and construction methods. It will necessary to make assumptions with the advice of the design team regarding some aspects of the construction process. Assumptions will be precautionary and reflect the reasonably foreseeable worst case in terms of construction noise effects. These assumptions are based on experience from similar projects.

Airspace Design and DCO processes

- 16.7.2 The Airspace Change Process is charged with designing the future airspace. The DCO Project cannot design airspace – the ACP and DCO processes must remain individually robust and must not directly or indirectly constrain the ACP design.
- 16.7.3 The maturity of the ground infrastructure masterplan can be reasonably well defined by the time of the DCO, this cannot be the case for the airspace proposals if CAA guidance and best practice is to be followed and therefore indicative airspace designs must be used in the assessment.
- 16.7.4 This is consistent with the revised draft ANPS (paragraph 5.51), at the time of the DCO application the assessment of aircraft noise will be undertaken with *the “...developing indicative airspace design. This may involve the use of appropriate design parameters and scenarios based on indicative flightpaths”*. Paragraph 5.49 of the revised draft ANPS, indicates that *“Precise flight path designs can only be defined at a later stage after detailed airspace design work has taken place”*.
- 16.7.5 The alignment of the ACP and DCO processes are presented in Graphic 16.1. The graphic shows the level of design information available from the ACP at key stages in the DCO process.



Graphic 16.1 Airspace Design State and Noise Considerations that can be made at each stage of ACP and DCO processes



16.7.6 In order to undertake an assessment of air noise, it will be necessary to model indicative airspace designs comprising indicative flight paths within route design envelopes, along with associated sensitivity testing. The indicative airspace designs will be developed by prototyping test cases and will be informed by feedback received from Consultation 1. A number of indicative flight paths will be developed for the Preliminary Environmental Information Report to be consulted on at Consultation 2 and these will be reviewed and, where necessary, revised for the preparation of the Environmental Statement to support the DCO application. They will remain indicative and any review and revision will be for the purposes of conducting the noise assessment only. The airspace change process will continue beyond the DCO process.

16.7.7 As airspace design is a matter for the independent ACP, the DCO will not be able to control the design of the airspace to serve a three runway airport. The Environmental Statement will, however, consider indicative airspace designs to allow an assessment of likely significant effects that would arise from operation of the three runway airport, irrespective of the detail of the eventual airspace design.



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Future aircraft type performance

- 16.7.8 To model aircraft noise in future years, assumptions will need to be made regarding the aircraft fleet mix in the future operational scenarios with and without the DCO Project.
- 16.7.9 Based on the ICAO requirement to reduce noise at the source⁵⁵, it is expected that noise from next generation aircraft will be quieter than today's aircraft, however, at this time the actual noise levels are uncertain. A sensitivity analysis (including a worst-case assessment) of noise from future aircraft types will be undertaken for future operational scenarios based on research and analysis of future development of aircraft types.

16.8 Likely significant effects requiring assessment

- 16.8.1 The likely significant effects that will be assessed in the noise and vibration assessment are defined in Table 16.4 according to each of the noise sources associated with the DCO Project, the health and quality of life outcome that will be assessed and the type of receptors where these effects may occur.

Table 16.4 Likely significant noise effects

Noise source	Effect (including health outcome being assessed)	Receptors
Construction		
Site/Construction including borrow pits*	<i>Direct effects</i> could be caused by airborne noise, or vibration from construction activities such as tunneling, demolition, earthworks, borrow pits, runway, bridges, road and rail realignments, utility works and airport buildings. These activities would be supported from local construction and contractor compounds close to the site and structure or tunnel being constructed, local worksites, or larger worksites from where activities are coordinated including supply via a railhead.	People, primarily where they live ('residential receptors') in terms of individual dwellings and on a wider community basis, including any
Road		
Railway*		

⁵⁵ International Civil Aviation Organization, Guidance on the Balanced Approach to Aircraft Noise Management, ICAO 9829 AMD 1, 2008.



Noise source	Effect (including health outcome being assessed)	Receptors
Combined	<p><i>Indirect effects</i> could be caused by temporary changes to road and rail on the existing networks during construction.</p> <p><i>Project-wide combined effects</i>, as well as <i>cumulative effects with other developments</i> will be assessed.</p> <p>For residential receptors health outcomes assessed will include:</p> <ol style="list-style-type: none"> 1. Annoyance 2. Sleep disturbance. <p>For sensitive non-residential receptors health outcomes assessed will include:</p> <ol style="list-style-type: none"> 1. Annoyance 2. Disruption of function (for example cognitive impairment in schools). 	<p>shared community open areas^{56 57}</p> <p>Community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as ‘non-residential receptors’, and ‘quiet areas’⁵⁸</p>
Operation		
Airfield - Aircraft on the ground	<p><i>Direct effects</i> could be caused by the operational airport (including: air traffic movements; ground noise from aircraft; airfield operations; low frequency noise; and maintenance, repair and overhaul of aircraft), its surface access proposals and associated developments such as airport hotels.</p> <p><i>Indirect effects</i> could be caused by short, medium and long-term changes to road and rail traffic patterns on the existing network.</p> <p><i>Project-wide combined effects</i>, as well as <i>cumulative effects with other developments</i> will be assessed.</p>	<p>People, primarily where they live (‘residential receptors’) in terms of individual dwellings and on a wider community basis, including any</p>
Airfield - Static sources		
Airborne aircraft		
Road		
Railway*		
Combined sources		
Aircraft/Airport maintenance and supporting infrastructure		

⁵⁶ Shared community open areas’ are those that the national planning practice guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (for example park to local green space) that is nearby.

⁵⁷ Department for Communities and Local Government, National Planning Practice Guidance: Noise, 2014 (DCLG, 2014).

⁵⁸ ‘Quiet areas’ comprise areas designated under Local Plans or Neighbourhood Development Plans as Local Green Spaces and areas identified as Quiet Areas through implementation of the Environmental Noise (England) Regulations 2006.



Noise source	Effect (including health outcome being assessed)	Receptors
	<p>For residential receptors health outcomes assessed in line with governments WebTAG and will include:</p> <ol style="list-style-type: none"> 1. Annoyance 2. AMI 3. Sleep disturbance 4. Hypertension - (stroke/dementia). <p>For sensitive non-residential receptors health outcomes assessed will include:</p> <ol style="list-style-type: none"> 1. Annoyance. 	<p>shared community open areas^{59 60}</p> <p>Community facilities such as schools, hospitals, places of worship, and also commercial properties such as offices and hotels, collectively described as ‘non-residential receptors’, and ‘quiet areas’⁶¹</p>
<p>*Vibration will also be assessed for this source.</p>		

16.8.2 An extensive evidence review has been undertaken (and will be updated throughout the assessment period) to identify the health and quality of life effects associated with the noise sources scoped into the assessment.

16.8.3 The evidence review⁶² will also identify the best available evidence exposure-response functions (ERF) to be used in the assessment for each health and quality of life outcome. An ERF illustrates the relationship between noise exposure and a health or quality of life outcome: for example, annoyance ERFs plot the impact of an increase in noise exposure (assessed using standard metrics such as $L_{Aeq, 16hr}$) and the percentage highly annoyed in the population. ERF are available for a range of standard metrics, for example, $L_{Aeq, 16hr}$, $L_{Aeq, 8hr}$ or L_{den} for various health and quality of life outcomes (refer to Table 16.9 for further information re. the metrics to be used in the assessment). The best available evidence is

⁵⁹ Shared community open areas are those that the national planning practice guidance identifies may partially offset a noise effect experienced by residents at their dwellings and are either a) relatively quiet nearby external amenity spaces for sole use by a limited group of residents as part of the amenity of their dwellings or b) a relatively quiet external publicly accessible amenity space (for example park to local green space) that is nearby.

⁶⁰ DCLG, 2014.

⁶¹ ‘Quiet areas’ comprise areas designated under Local Plans or Neighbourhood Development Plans as Local Green Spaces and areas identified as Quiet Areas through implementation of the Environmental Noise (England) Regulations 2006.

⁶² The assessment set out here is informed by the Guidelines for Community Noise, World Health Organization, 1999. These guidelines are currently being updated and are expected to be published in mid-2018. The updated guidelines will be taken into account in the assessment as relevant.



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considered to include evidence from systematic reviews, as well as individual studies carried out on samples around Heathrow or airports within the UK, as well as internationally important large-scale epidemiological studies. Exposure-response functions published in the recent systematic evidence reviews undertaken for the revision of the World Health Organization's (WHO) *Environmental Noise Guidelines (1999)* will be considered for use in the assessment⁶³, along with recent national publications such as the *Survey of Noise Attitudes 2014*⁶⁴ and the *National Noise Attitude Survey 2012*⁶⁵. The ERFs will be used alongside the WebTAG methodology and/or to provide sensitivity analysis, where appropriate.

- 16.8.4 The noise chapter of the ES will report on the likely significant effects evaluated using LOAEL and SOAEL values for each noise source, in line with policy requirements (refer to Table 16.1). In terms of government noise policy, where the predicted noise (or vibration) exceeds the relevant SOAEL value for the noise source as a result of the DCO Project, then the assessment will identify a significant adverse effect on health and quality of life at each receptor. In line with best practice, the assessment will also identify likely significant effects (adverse or beneficial) in respect of the *Town and Country Planning (Environmental Impact Assessment) 2017* (EIA regulations) on both individual receptors and on an area basis due to increases or decreases in noise exposure in situations where the predicted noise or vibration is above the relevant LOAEL value (refer to section 16.10).
- 16.8.5 For some health outcomes, it will be necessary for the assessment of noise effects on health to be undertaken on a wider-geographical scale than the receptor or area based approach described above, for example, health outcomes such as AMI and hypertension (stroke/dementia) which have a low prevalence in the population will need to be considered across a wider-geographical area.

16.9 Effects not requiring assessment

- 16.9.1 Vibration from construction and operational road traffic on new, altered or existing roads has been scoped out of this assessment. This is in line with DMRB⁶⁶, which states that appreciable vibration is not generated by a road with a well maintained road surface. Operational or construction traffic is therefore also unlikely to result in significant effects resulting from vibration and will not therefore be assessed.

⁶³ Special Issue "WHO Noise and Health Evidence Reviews."
http://www.mdpi.com/journal/ijerph/special_issues/WHO_reviews (accessed 28 March 2018)

⁶⁴ CAA, 2014.

⁶⁵ Defra, National Noise Attitude Survey 2012, NNAS2012, December 2014 (Defra, 2014)

⁶⁶ Highways England, 2011.



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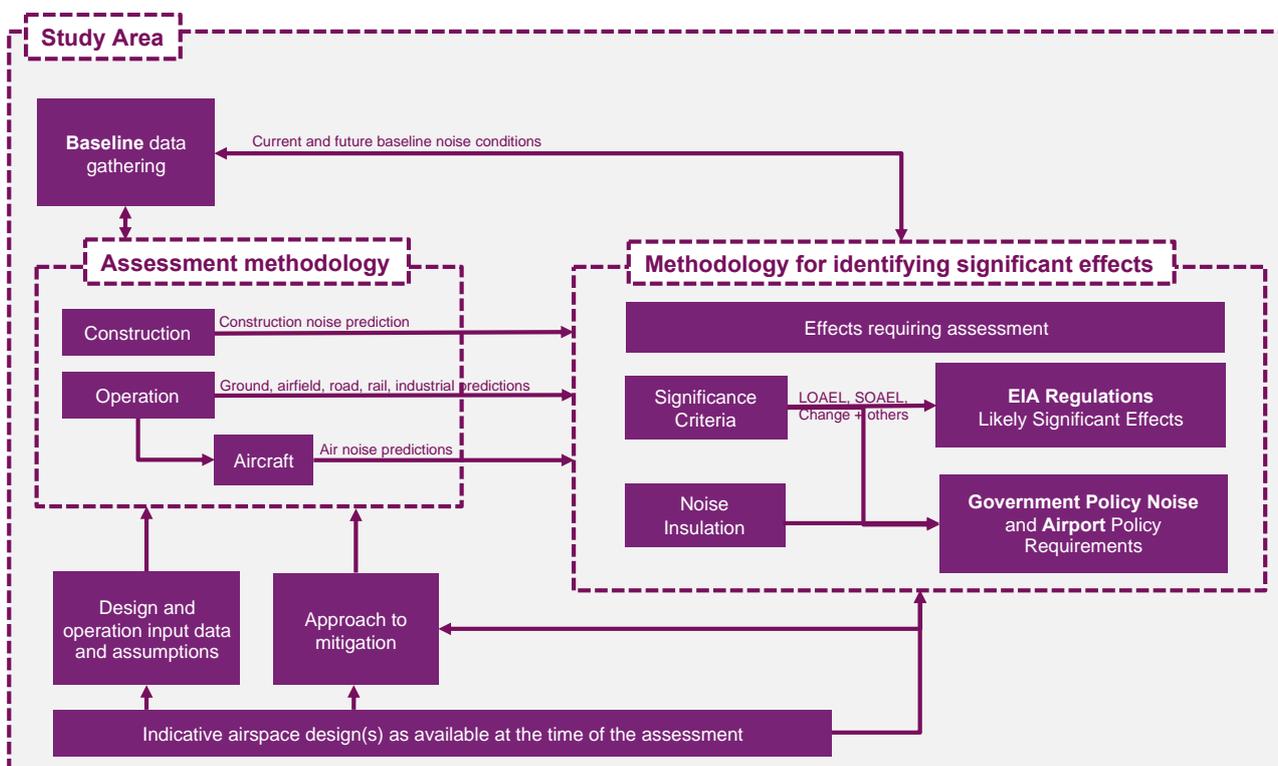
16.9.2 Hearing loss has been scoped out of the assessment as evidence for environmental noise effects from sources such as aircraft and road traffic suggests that there would be no effect of environmental noise exposure on hearing loss.^{67 68} Hearing loss is associated with long-term exposure to very high noise levels, such as occupational and industrial noise exposures higher than $L_A 75-85dB$ ⁶⁹ or through exposure to an intense impulse sound, such as gunfire.

16.10 Proposed approach to the assessment

Overview

16.10.1 This section sets out the approach to the assessment of noise (including vibration) which is illustrated in Graphic 16.2.

Graphic 16.2 The approach to the assessment



16.10.2 Study areas for each source have been set out in Section 16.4. These will be kept under review as the design and consultation processes progress, and the DCO Project is refined - the study areas may therefore evolve as appropriate.

⁶⁷ Sliwinska-Kowalska, M. & Zabrowski, K, WHO Environmental Noise Guidelines for the European Region: A systematic review on environmental noise and permanent hearing loss and tinnitus. International Journal of Environmental Research and Public Health, 14, 1139, 2017

⁶⁸ Basner, M. et al. Auditory and non-auditory effects of noise on health. Lancet, 383, 1325-32, 2014

⁶⁹ Op.Cit.



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- 16.10.3 The assessment and methodologies have been designed to be applied to address the all component options described in **Chapter 3: The DCO Project** which may be selected through the masterplan scheme assessment process.
- 16.10.4 This section will first set out the assessment years that are proposed to be used in the noise assessment.
- 16.10.5 Secondly, it will identify the methodology for assessing each of the following aspects of the assessment, based on relevant standards, guidance and precedent including:
1. Construction Noise and Vibration
 2. Operational Noise and Vibration:
 - a) Aircraft noise (including helicopters as appropriate)
 - b) Aircraft ground noise
 - c) Static (fixed) noise sources
 - d) Road and rail traffic noise.
- 16.10.6 Thirdly, it will explain the approach to identifying likely significant effects in line with noise policy and EIA regulation. This section also set outs the approach to evaluating combined effects; these being effects on a receptor surrounding the airport being exposed to noise from more than one source associated with the DCO Project (for example aircraft noise and road noise) or a receptor very close to the airport being exposed to both construction noise and vibration.
- 16.10.7 A Noise Expert Review Group (NERG) has been established to provide independent assurance regarding the scientific and policy robustness of the assessment and mitigation of noise (including vibration) effects, including effects on health and quality of life, associated with the DCO Project. NERG is an advisory group that neither support nor oppose the DCO Project. **Appendix 16.2: Noise Expert Review Group** provides details and biographies for the members of the NERG, as well as the Terms of Reference for the group.
- 16.10.8 The UK Government is currently establishing the ICCAN. ICCAN will have responsibilities for creating, compiling and disseminating best practice to the aviation industry. Input and guidance will be sought on the scientific and policy robustness of the assessment and mitigation of sound, noise and vibration, including effects on health and quality of life, and in particular Heathrow's noise envelope and runway alternation (to provide predictable period of respite). Section 16.3: Stakeholder engagement details Heathrow's plans to engage with the ICCAN, once established, throughout the DCO process.



Assessment years

- 16.10.9 The assessment years presented in this section have been determined specifically for the purposes of the noise assessment.
- 16.10.10 The DCO Project would be constructed and implemented over a number of years and as such, several assessment years will need to be considered in the topic assessments. The revised draft ANPS requires (paragraph 5.51) the noise assessment to be undertaken for any period of change prior to the opening, for the time of opening, for the time the development is forecast to reach full capacity, and for when the development noise impact is forecast to be highest (if different from any of the previous assessments).
- 16.10.11 In response to these requirements, the proposed assessment years are as follows:
1. 2013 Baseline⁷⁰
 2. Current baseline – the ‘current’ baseline at the point of DCO submission (for noise this will be 2018 when the majority of baseline noise data will be collected)
 3. Future baseline (do minimum and do something scenario) – multiple future baseline years will be defined for both the construction and operational phases to align with the years identified through points six to eight below. Multiple future years will be necessary to allow for anticipated changes. This is because the environmental effects associated particularly with operations may change over time, for example, aircraft/road vehicles will become quieter or produce lower emissions. In addition, future baseline year(s) will be defined as a ‘do minimum’ scenario (rather than a ‘do nothing’ scenario). This is because the noise effects associated with the two-runway airport will change over time to incorporate new technology. For example, Performance Based Navigation (PBN) will be introduced, irrespective of whether the airport will be expanded or not. Therefore, a two runway Masterplan will be produced that considers how the Airport will evolve in the absence of expansion and this will form the basis of the future ‘do minimum’ baselines.
 4. Release of first phase of capacity – where the number of ATMs first increase (the ‘early ATMs’), even if this is prior to the third runway being operational. Such early ATMs are not considered likely to change the expected maximum number of ATMs associated with the DCO Project and therefore if early ATMs for whatever reason do not occur, the corresponding number of ATMs will occur as part of the increase associated with the opening of the new runway

⁷⁰ Paragraph 5.57 of the revised draft ANPS requires noise mitigation measures which “should ensure the impact of aircraft noise is limited and, where possible, reduced compared to the 2013 baseline assessed by the Airports Commission”.



5. Year of predicted maximum environmental effects from during the construction phase. Note that operation of the third runway is expected to commence before all construction activities are complete and therefore consideration of the need for an assessment of effects from both the combined operational and construction activities will also be made
6. Year of opening – the year that the first aircrafts use the new third runway
7. Year of predicted maximum environmental effects during the operational phase – this will be the year at which ATMs, road vehicles and any other relevant DCO Project activity will, cause the greatest impact
8. Year of maximum ATM capacity – the year in which the maximum forecasted number of ATMs utilise the Airport.

Construction assessment methodology: source by source

- 16.10.12 This section sets out the methodologies that will be employed to predict levels of noise and vibration during the construction phase of the DCO Project. For each source (construction noise and construction vibration) the following are set out:
1. The standards and guidance for the prediction of noise relevant to the source
 2. The input information, such as construction programme information and construction methodologies, that will be used to predict noise for that source
 3. The prediction methods that will implement the relevant standards and guidance to predict noise from the source using the available input information
 4. The form of initial reporting in line with standards and guidance that will be fed into the assessment of significance which is defined in ‘Methodology for Identifying Significant Effects’.
- 16.10.13 The methodology for identifying likely significant effects significance in line with Government Policy and EIA Regulations is described for all sources under the heading ‘Methodology for Identifying significant effects’ later in this chapter, which also defines relevant LOAEL and SOAEL values for the noise metrics described (refer to Table 16.7).

Construction noise

Standards and guidance

- 16.10.14 The following standards and guidance are relevant to the prediction of assessment of construction noise and will be implemented in the noise and vibration assessment:
1. Construction activities within construction sites (direct effects):



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- a. BS5228-1:2009+A1: 2014 *Code of practice for noise and vibration control on construction and open sites: Part 1 – Noise (BS5228-1)*⁷¹.
2. Construction traffic on existing roads and railways (indirect effects):
 - a. Calculation of Road Traffic Noise (CRTN), 1988⁷²
 - b. Calculation of Railway Noise (CRN), 1995⁷³

Input information

- 16.10.15 For each construction site the following information will be used to predict construction noise:
1. Construction phasing information which sets out the temporal and spatial scope of the various construction activities required to construct the DCO Project
 2. Assumed construction methodologies including inventories of plant / equipment, their location and their percentage on-times. These will be used to determine activity noise levels for different construction activities with reference to source sound level data for plant and equipment
 3. Locations and specification of site hoarding, screening and enclosures
 4. Construction working hours
 5. Existing roads and railways required for construction site access and deliveries
 6. Road and rail construction traffic forecasts throughout the full construction programme.
- 16.10.16 This construction information would be used to develop a set of reasonably foreseeable worst-case input assumptions for the construction noise assessment.

Prediction methods

- 16.10.17 Noise from construction sites will be predicted using models according to the methods set out in BS5228-1.⁷⁴
- 16.10.18 Change in noise levels due to temporary changes on existing roads and railways due to construction traffic will be calculated by comparing the Basic Noise Levels

⁷¹ BSI, 2014a.

⁷² Department of Transport, Calculation of Road Traffic Noise, HMSO, 1988 (DfT, 1988).

⁷³ Department of Transport, Calculation of Rail Noise, HMSO, 1995 (DfT, 1995).

⁷⁴ BSI, 2014a.



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(source levels), as defined by CRTN⁷⁵ and CRN⁷⁶, with and without construction traffic.

Initial reporting in line with standards and guidance

- 16.10.19 For construction site noise, The BS5228-1 methodology will be used to predict external noise levels during construction at noise sensitive receptors within the study area based on reasonably foreseeable worst-case assumptions derived from the construction information. At all noise sensitive receptors the daytime, evening and night time period noise levels for a worst case and typical month ($L_{Aeq,T}$) will be predicted at various points across the construction programme for comparison with impact criteria set out in BS5228-1.
- 16.10.20 Direct impacts will be assessed at residential noise sensitive receptors using the impact criteria defined using Method 2 (the ‘ABC method’) described in Annex E of BS5228-1 (refer to Table 16.5). Method 2 sets impact thresholds for construction noise depending on baseline ambient noise levels at the noise sensitive receptors.

Table 16.5 Construction noise impact thresholds for residential receptors from the ‘ABC Method’ in BS5228-1

Period	Category A	Category B	Category C
Daytime	65 dB $L_{Aeq,12hr}$	70 dB $L_{Aeq, 12hr}$	75 dB $L_{Aeq, 12hr}$
Evening	55 dB $L_{Aeq, 4hr}$	60 dB $L_{Aeq, 4hr}$	65 dB $L_{Aeq, 4hr}$
Night-time	45 dB $L_{Aeq, 8hr}$	50 dB $L_{Aeq, 8hr}$	55 dB $L_{Aeq, 8hr}$
Definitions and notes: Daytime – Weekdays (0700-1900) and Saturdays (0700-1300) Evening – Weekdays (1900-2300), Saturdays (1300-2300), Sundays and Bank Holidays (0700-2300) Night-time – Weekdays, Weekends and Bank Holidays (2300-0700) Category A –threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values Category B –threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values Category C –threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			

- 16.10.21 The assessment would take due account of the planned noise insulation offer, existing noise insulation, and, if necessary, temporary re-housing offered in line with the DCO Project’s draft Code of Construction Practice (CoCP).
- 16.10.22 Direct impacts arising from construction site noise at noise sensitive non-residential receptors will initially be identified on a precautionary basis by comparing predicted construction noise levels with the screening criteria set out in

⁷⁵ DfT, 1988.

⁷⁶ DfT, 1995.



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Table 16.10. Where the predicted levels, taking account of mitigation, exceed the screening criteria then a receptor specific assessment will be undertaken and reported in the ES.

- 16.10.23 Indirect effects of temporary changes in traffic patterns caused by construction traffic will be assessed using the predicted change in noise levels during the day and night (the change in $L_{Aeq,T}$) along a road or railway considered in the context of the type, sensitivity and the number of receptors adjacent to the road or railway.

Construction vibration

Standards and guidance

- 16.10.24 The following standards and guidance are relevant to construction vibration and will be implemented to predict vibration during the construction phase:
1. BS5228-2 Code of Practice for Noise and Vibration Control on Open Construction Sites – Part 2: Vibration⁷⁷
 2. BS6472-1 Guide to evaluation of human exposure to vibration in buildings: 1- Vibration sources other than blasting 2-Blast-induced vibration⁷⁸
 3. BS7385-2 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground-borne vibration⁷⁹.

Input information

- 16.10.25 For each construction site the following information will be used to predict construction noise:
1. Construction phasing information which sets out the temporal and spatial scope of the various construction activities required to construct the DCO Project
 2. Assumed construction methodologies including inventories of the vibration generating plant as set out in BS5228-2⁸⁰ and required for each phase and construction location. This information would be used to define vibration source levels for plant operating at each construction site.
 3. Construction working hours.

⁷⁷ BSI, 2014b.

⁷⁸ British Standard Institute, BS 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings: Vibration Sources Other than Blasting, 2008 (BSI, 2008)

⁷⁹ British Standards Institute, BS 7385-2:1993 Evaluation and measurement for vibration in buildings: Part 2 Guide to damage levels from ground-borne vibration, 1993 (BSI, 1993)

⁸⁰ BSI, 2014b.



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- 16.10.26 This construction information would be used to develop a set of reasonably foreseeable worst-case input assumptions for the construction noise assessment.

Prediction methods

- 16.10.27 Vibration from construction sites at all identified vibration sensitive receptors and assessment years will be predicted using calculation software specifically designed and verified so that they predict the period Peak Particle Velocity (PPV) at vibration sensitive receptors within the study area according to the guidance in Transport Research Laboratory (TRL) Report 53⁸¹ and TRL Report 429⁸² and BS5228-2.

Initial reporting in line with standards and guidance

- 16.10.28 For assessing potential damage to buildings, predicted external PPV values at vibration sensitive receptors will be compared to the thresholds for the onset of building damage set out in BS7385-2⁸³.
- 16.10.29 For assessing potential effects in the form of annoyance and disturbance to the occupants of buildings, predicted PPV values will be converted to period Vibration Dose Values (VDVs) inside vibration sensitive receptors using established techniques and compared to the VDV thresholds for the onset of human annoyance and disturbance from vibration set out in BS6472-1⁸⁴.
- 16.10.30 Potential impacts of construction site vibration at vibration sensitive non-residential receptors will initially be identified on a precautionary basis by comparing predicted construction noise levels with the screening criteria set out in Table 16.14. Where the predicted levels, taking account of mitigation, exceed the screening criteria then a receptor specific assessment will be undertaken and reported in the ES.

Operation assessment methodology: Source by source

- 16.10.31 This section sets out the methodologies that will be employed to predict levels of noise and vibration during the operational phase of the DCO Project for the following sources:
1. Aircraft noise (including helicopters as appropriate)
 2. Aircraft ground noise

⁸¹ Transport Research Laboratory, Report 53 Ground vibration caused by civil engineering works, 1986

⁸² Transport Research Laboratory, Report 429, Groundborne vibration caused by mechanised construction works, 2000

⁸³ BSI, 1993.

⁸⁴ BSI, 2008.



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3. Road traffic noise
4. Rail Noise
5. Rail Vibration
6. Other noise sources (for example fixed sources).

16.10.32 For each source the following are set out:

1. The standards and guidance for the prediction of noise relevant to the source
2. The input information, such as aircraft operating parameters and masterplan design information, that will be used to predict noise for that source
3. The prediction methods that will implement the relevant standards and guidance to predict noise from the source using the available input information
4. The form of initial reporting in line with standards and guidance that will be fed into the assessment of significance which is defined in 'Methodology for Identifying Significant Effects'.

Aircraft noise (including helicopters)

Standards and guidance

16.10.33 The following standards and guidance are relevant to the prediction of noise from aircraft in the air:

1. The European Civil Aviation Conference report on *Standard Method of Computing Noise Contours Around Civil Airports*⁸⁵
2. AIR1845 *Procedure for the Calculation of Airplane Noise in the Vicinity of Airports*⁸⁶
3. *UK Air Navigation Guidance 2017 (ANG)*⁸⁷
4. *Civil Aviation Authority's CAP1616 Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, 2017*⁸⁸.

⁸⁵ European Civil Aviation Conference Doc 29 (4th Edition) Report on Standard Method of Computing Noise Contours around Civil Airports (Fourth edition, as adopted by DGCA/147 on 7 December 2016). Volumes 1 – 3, 2016

⁸⁶ Society of Automotive Engineers, SAE-AIR1845 Procedure for the Calculation of Airplane Noise in the Vicinity of Airports, 1995

⁸⁷ DfT, 2017b.

⁸⁸ CAA, 2017a.



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Input information

- 16.10.34 Operational aircraft noise will be predicted using design and operational parameters for aircraft in the relevant assessment years using:
1. 24hr “busy day” flight schedules for each assessment year
 2. Forecast number of annual ATMs for each assessment year
 3. Aircraft fleet mix for each assessment year
 4. Assumptions for aircraft types noise performance for those aircraft forecast to operate in the future that are not currently in operation
 5. Runway geometries – including runway length, location, arrival threshold locations and positions of start of take-off roll
 6. Assignment of aircraft movements to routes, runways for each operational mode
 7. The split between easterly and westerly operations
 8. Aircraft flight performance – for example climb and descent profiles
 9. Existing flight tracks to generate baseline scenarios
 10. Indicative airspace test case designs (or designs) available at time of developing the environmental assessment to support the DCO application based on the airspace design envelope as developed through the ACP.
- 16.10.35 Using this information proprietary noise modelling software will be used to predict noise levels and contours for all assessment years and operational scenarios to enable the extent of noise impacts to be identified.

Prediction methods

- 16.10.36 Predictions will be made in accordance with:
1. The European Civil Aviation Conference report on *Standard Method of Computing Noise Contours Around Civil Airports*⁸⁹
 2. AIR1845 *Procedure for the Calculation of Airplane Noise in the Vicinity of Airports*⁹⁰.
- 16.10.37 Paragraph 1.19 of the environmental requirements technical annex to CAP1616 states that “*The contours must be produced using a recognised and validated noise model such as the UK Aircraft Noise Contour Model (ANCON) or the US*

⁸⁹ ECAC Doc 29 4th Edition Report on Standard Method of Computing Noise Contours around Civil Airports (Fourth edition, as adopted by DGCA/147 on 7 December 2016). Volumes 1 – 3, 2016

⁹⁰ Society of Automotive Engineers, SAE-AIR1845 Procedure for the Calculation of Airplane Noise in the Vicinity of Airports, 1995



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Aviation Environmental Design Tool (AEDT)". Therefore, modelling for the DCO Project will be undertaken using AEDT or ANCON or both.

- 16.10.38 AEDT will generally be used to support design and assessment of the DCO Project in both DCO and ACP (as noted in CAP1616). At the time of writing, the latest version is 2.0d. Should the version change during the process a review will be undertaken to assess whether the more up to date version should be adopted and the associated implications.
- 16.10.39 ANCON will generally be used to make final predictions in support of approval processes in both DCO and ACP (as noted in CAP1616). The latest version is understood to be 2.3.
- 16.10.40 Aircraft noise models developed in AEDT will be validated by CAA ERCD using the equivalent ANCON outputs and using existing Heathrow aircraft noise monitoring data.
- 16.10.41 The CAA will provide validation of the way in which future assumptions have been incorporated into the AEDT model.

Initial reporting in line with standards and guidance

- 16.10.42 For assessing the potential effects of aircraft noise, the models will be used to predict the 92 day average summer daytime $L_{Aeq,16hr}$ (the 16hr daytime period is 07:00 to 23:00 local time) and night time $L_{Aeq,8hr}$ (the 8hr night-time is 23:00 to 07:00 local time) noise metrics for the various baseline and assessment years and the annual L_{den} . These are the primary metrics for assessing likely significant effects from aircraft noise (refer to Graphic 16.3).
- 16.10.43 Outputs will generally take the form of the relevant noise values at grid centres (to meet relevant standards and guidance, but typically at approximately 100m intervals) and noise contours.
- 16.10.44 Noise levels will also be assigned to postcode points to enable area based assessment of effects.
- 16.10.45 Demographic data for each of the forecast years will be used to count of population, households, schools, hospitals, place of worship (and other noise sensitive receptors) at each postcode centroid.
- 16.10.46 The models will also be used to predict additional metrics to support the assessment of significant effects from aircraft noise. These will include (but not be limited to):
1. Maximum noise level from individual aircraft flight operations (L_{Amax})
 2. Number of Events Above metrics such as the N65(16hr) during the daytime periods and N60(8hr) during the night-time periods. The N65 is the number of



events that exceed 65 dB L_{Amax} and the N60 is the number of events that exceeds 60dB L_{Amax} .

3. Objective awakenings spatial distribution based on the L_{Max} outputs defined above during the night-time period.

16.10.47 The primary and additional outputs will be generated for the following cases:

1. The 92-day summer overall average daytime 16hr and night-time 8hr
2. The 92-day summer average easterly and average westerly daytime 16hr and night-time 8hr
3. Daytime 16hr and night-time 8hr for each mode of operation
4. Maximum noise level from individual aircraft flight operations (L_{Amax}) will be derived for aircraft operations at night
5. Objective awakenings for the night-time period (23:00 to 07:00) generated from the L_{Amax} data for the summer overall average night-time, the average easterly and westerly night-time and the night-time mode specific cases.

16.10.48 Should mitigation or the requirements for a specific receptor type indicate a requirement for alternative time periods or cases to be modelled, this will be considered on a case by case basis.

Aircraft ground noise

Standards and guidance

16.10.49 There are no current standards or guidance available specific to aircraft ground noise. However, Annex II of the Environmental Noise Directive⁹¹ states that the noise produced during aircraft ground operations may be considered to be transport infrastructure and that the attenuation due to atmospheric absorption may be predicted using ISO 9613-2: 1996 *Acoustics – Attenuation of sound during propagation outdoors – Part 2: general Method of Calculation* (ISO 9613-2)⁹². The approach to predicting aircraft ground noise will therefore be to characterise the sources of noise using information about the aircraft and operation parameters and to predict the noise at sensitive receptors away from the airfield using ISO9613-2.

⁹¹ Commission Directive (EU) 2015/996 of 19 May 2015 establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council

⁹² International Standards Organisation, *Acoustics – Attenuation of sound during propagation outdoors – Part 2: general Method of Calculation*, International Standard ISO 9613-2: 1996 (E), (ISO, 1996)



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Input information

- 16.10.50 Aircraft ground noise operations will be determined using aircraft ground operations data simulated in Total Airspace and Airport Modeler (TAAM)⁹³. TAAM is simulation software used by NATS which contains the following information for use in ground noise prediction:
1. Location and naming convention of taxiways
 2. Average taxi speeds / engine on-times per metre length of taxiway
 3. Movements by aircraft type on the taxiways
 4. Location of aircraft holding and hold points and time in hold
 5. Stand locations and names
 6. Stand turnarounds times.
- 16.10.51 Source noise levels for aircraft will be established from:
1. Data describing noise levels of aircraft which may include baseline measurements during current operations
 2. Directivity patterns relating to aircraft noise emissions
 3. Data describing the spectral content of aircraft noise emissions.
- 16.10.52 Finally, predictions at noise sensitive receptors will be undertaken using ISO9613-2⁹⁴ taking account of geometrical parameters defined in the ground model which includes:
1. Ground level
 2. Buildings and their elevations
 3. Purpose-built screens
 4. Locations of acoustically absorbent and reflective ground types.

Prediction methods

- 16.10.53 Aircraft ground noise will be predicted by defining noise source characteristics of aircraft on the ground (defined by on-site noise measurements) and predicting noise propagation away from the noise sources in accordance with ISO 9613-2.
- 16.10.54 All ground noise models will be validated against existing Heathrow noise monitoring data.

⁹³ Total Airspace and Airport Modeler (TAAM) Rapid airport and airspace simulation modelling <http://ww1.jepesen.com/aviation/products/taam/total-airspace-airport-modeler.jsp> (accessed 15 May 2018)

⁹⁴ ISO, 1996.



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Initial reporting in line with standards and guidance

16.10.55 For assessing the potential effects of aircraft ground noise, the models will initially be used to predict the daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ noise metrics as noise contours for the various baseline and assessment years. This will allow ground noise to be combined, as necessary, with aircraft noise in the vicinity of the Airport.

Road noise

Standards and guidance

16.10.56 The following standards are relevant to the prediction of noise from roads and railways:

1. *DMRB, Volume 11, Section 3, Part 7 HD 213/11 – revision 1: noise and vibration*⁹⁵
2. *Calculation of Road Traffic Noise, 1988*⁹⁶
3. *Method for Converting the UK Road Traffic Noise Index $L_{A10,18hr}$ to the EU Noise Indices for Road Traffic Noise Mapping, 2006*⁹⁷
4. The Noise Insulation Regulations 1975.

Input information

16.10.57 For all roads, the following operational and design information will be used to predict road traffic noise:

1. Locations and design of new or altered roads as set out in the Masterplan
2. Road traffic forecasts for all assessment years on new, altered and existing roads including the proportion of HGVs and forecast / existing speeds
3. Three-dimensional design and baseline information relating to new, altered and existing roads.

Initial reporting in line with standards and guidance

16.10.58 For assessing the potential effects of road noise, the models will initially be used to predict the daytime $L_{A10,18hr}$ which is the standard output of the Calculation of Road Traffic Noise Methodology. Using the Defra methods⁹⁸ as relevant the daytime $L_{A10,18hr}$ metric will be converted into daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ noise

⁹⁵ Highways England, 2011.

⁹⁶ DfT, 1988.

⁹⁷ Defra, Method for Converting the UK Road Traffic Noise Index $L_{A10,18hr}$ to the EU Noise Indices for Road Traffic Noise Mapping, Report ST/05/91/AGG04442, 2006 (Defra, 2006)

⁹⁸ Op.Cit.



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metrics. These are the primary metrics for assessing likely significant effects from road noise (refer to Graphic 16.3).

- 16.10.59 For assessing the potential effects of rail noise, the models will be used to predict the daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ noise metrics. These are the primary metrics for assessing likely significant effects from rail noise (refer to Graphic 16.3).

Rail noise

Standards and guidance

- 16.10.60 The following standards are relevant to the prediction of noise from railways:
1. *DMRB, Volume 11, Section 3, Part 7 HD 213/11 – revision 1: noise and vibration*⁹⁹
 2. *Calculation of Railway Noise, 1995*¹⁰⁰
 3. The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1995.

Input information

- 16.10.61 For all railways, the following operational and design information will be used to predict noise levels:
1. Locations and design of new or altered railways as set out in the Masterplan
 2. Rail traffic forecasts for all assessment years on new, altered and existing railways including the proportion of freight trains and forecast / existing speeds
 3. Three-dimensional design and baseline information relating to new, altered and existing railways.

Prediction outputs for assessment

- 16.10.62 For assessing the potential effects of rail noise, the models will be used to predict the daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ noise metrics. These are the primary metrics for assessing likely significant effects from rail noise (refer to Graphic 16.3).

⁹⁹ DfT, 1988.

¹⁰⁰ DfT, 1995.



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Railway vibration

Standards and guidance

- 16.10.63 The following standards are relevant to the prediction of vibration from railways:
1. BS 6472-1:2008 *Guide to evaluation of human exposure to vibration in buildings: 1-Vibration sources other than blasting*¹⁰¹
 2. ISO14837-1:2005 *Mechanical vibration – Ground-borne noise and vibration arising from rail systems – Part 1: General Guidance (ISO 14837-1)*¹⁰².

Input information

- 16.10.64 For each railway the following information will be used to predict railway vibration:
1. Rail traffic forecasts for all assessment years on new, altered and existing railways and railways including speeds
 2. Three-dimensional design information relating to new, altered and existing roads
 3. Geotechnical information relating to the ground conditions below the railway and in the propagation path from the railway to the vibration sensitive receptors.

Prediction methods

- 16.10.65 The ground-borne noise and vibration potentially generated by rail operations associated with the DCO Project, both temporary railway operations during construction and permanent, will be calculated empirically from thousands of measurements. This method is fully consistent with ISO 14837-1¹⁰³, and takes account of all key parameters, including train design, train speed, track design, tunnel design, tunnel depth, ground conditions, receiving building foundations and receiving building type. The method has been tested, validated and scrutinised for several railways around the world.

Prediction outputs for assessment

- 16.10.66 The train vibration models will be used to predict the VDV and maximum internal groundborne noise level (L_{ASMax}) at vibration sensitive properties within the study area.

¹⁰¹ BSI, 2008.

¹⁰² International Standards Organisation (ISO), ISO 14837:2005. Mechanical vibration – Ground-borne noise and vibration arising from rail systems – Part 1: General Guidance, 2005 (ISO, 2005)

¹⁰³ ISO, 2005.



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- 16.10.67 For assessing the potential impacts of human annoyance and disturbance from vibration the VDVs will be compared to thresholds for the onset of these impacts set out in BS6472-1¹⁰⁴.
- 16.10.68 For assessing the potential impacts of human annoyance and disturbance from groundborne noise, L_{ASMax} 's will be compared to appropriate thresholds for type of building impacted by ground borne noise.

Other noise sources (fixed noise sources)

- 16.10.69 The term static refers to fixed sources of noise associated with, for example, the operation of terminal buildings (for example a ventilation plant) and other airport operations (for example pumping equipment at the aviation fuel farm).

Standards and guidance

- 16.10.70 The potential impact of noise from static sources will be assessed in accordance with BS 4142: 2014 Methods for rating and assessing industrial and commercial sound (BS 4142)¹⁰⁵.

Initial reporting in line with standards and guidance

- 16.10.71 Design detail for assessing static noise sources is unlikely to be available at the time of the DCO. This is often the case at this stage for large infrastructure projects. It has been assumed that permanent static (fixed) sources will be designed and maintained so that they will avoid significant effects and will minimise adverse noise effects as far as sustainable.
- 16.10.72 A framework for mitigation of noise will be developed during the noise and vibration assessment which will limit noise from static sources, the framework may include methods for:
1. Specifying noise limits and incorporating acoustic requirements into contract documents such that they will apply to the design of all the fixed plant that are to be installed and operated as part of the DCO Project
 2. Determining the relevant background levels for specification of noise limits jointly with the relevant Local Authorities
 3. Procuring, installing and commissioning fixed plant, including sound attenuation equipment that meets the specification requirements

¹⁰⁴ BSI, 2008.

¹⁰⁵ British Standards Institute, BS 4142, Methods for rating and assessing industrial and commercial sound, 2014 (BSI, 2014)



4. Before formal operation of the fixed plant, a standard suite of acceptance tests as necessary to demonstrate that the operational sound levels achieve the design criteria.

Methodology for identifying significant effects

Overview

- 16.10.73 This section sets out the approach to identifying the significance of noise effects, positive and negative, that arise from the DCO Project.
- 16.10.74 The overarching concepts covered in this section are as follows:
1. Significant effects on health and quality of life
 2. Likely significant effects (adverse and beneficial)
 3. Combined effects
 4. Cumulative effects.
- 16.10.75 These concepts are introduced below.

Significant effects on health and quality of life

- 16.10.76 The revised draft ANPS, in line with government noise policy, requires
- “5.67 Development consent should not be granted unless the Secretary of State is satisfied that the proposals will meet the following aims for the effective management and control of noise, within the context of Government policy on sustainable development:*
- a. avoid significant adverse impacts on health and quality of life;*
 - b. mitigate and minimise adverse impacts on health and quality of life; and*
 - c. where possible, contribute to the improvement of health and quality of life.”*
- 16.10.77 In line with the first aim of government noise policy, significant effects on health and quality of life will be identified where the forecast noise from the DCO Project at a receptor newly exceeds the relevant SOAEL value. SOAEL values are defined in Table 16.7. The reasonable and practicable means envisaged for avoiding significant effect on health and quality of life will be presented in the PEIR and then the ES. In line with precedent in planning decision making, the means to avoid significant effects on health and quality of life include both mitigation incorporated into the DCO Project and noise insulation provided at the receptor.



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16.10.78 In line with the second and third aims of government noise policy, the assessment will also identify: adverse effects on health and quality of life (i.e. where exposure from the DCO Project is forecast to exceed the relevant LOAEL value from Table 16.7 but is below the relevant SOAEL); how mitigation is to be maximised to minimise such adverse effects; and where it is possible for the DCO Project and its associated mitigation to contribute to the improvement of health and quality of life.

Likely significant effects (adverse and beneficial)

16.10.79 The EIA Regulations require *‘the identification of likely significant effects, both positive and negative, and the envisaged mitigation to avoid or reduce the significant effects’*.

16.10.80 In line with the EIA Regulations, where the calculated noise exposure arising from the DCO Project lies above the relevant LOAEL value, then likely significant effects (adverse or beneficial) on individual receptors or on an area basis may be identified taking account of a number of factors for each noise source being considered.

16.10.81 Likely significant effects in line with the EIA Regulations are identified separately from and in addition to significant effects on health and quality of life that are identified in line with government noise policy.

16.10.82 The Primary factors considered (in combination) in the identification of likely significant effects are:

1. The calculated ‘noise exposure’ compared to the relevant LOAEL and SOAEL values
2. The calculated ‘change in noise level’ for the source being considered
3. The population (number of people) in an area exposed to the calculated ‘noise level’ and ‘change in noise level’ (likely significant effects are identified on individual receptors where the calculated exposure exceeds the relevant SOAEL value.

16.10.83 These primary factors are supported by a number of additional factors (discussed below) that take in to account the local context of the receiving environment and the noise arising from the DCO Project.

Combined effects

16.10.84 The combined effects that arise from a receptor being exposed to noise from different sources associated with the DCO Project will be identified in the ES.

16.10.85 Where likely significant effects from more than one source are identified at a receptor, then an additional combined likely significant effect will be reported.



- 16.10.86 Where non-significant effects from more than one source are identified at the same receptor or in the same area (i.e. levels of exposure for each source exceed the relevant LOAEL but are less than the relevant SOAEL) a qualitative assessment will be undertaken to identify any combined likely significant effects. The qualitative assessment will consider further factors such as:
1. Whether the noise from the different sources is likely to occur at the same time (for example construction and aircraft noise from an expanded Heathrow)
 2. The relative noise exposure of the different sources (for example is one source likely to dominate over the others or would the exposures combine to create a greater overall exposure)
 3. The relative effect caused by the exposure to the different sources drawing on available exposure-response information including any available guidance on combined effects
 4. Differences in the character of the noise sources (for example intermittent construction noise compared to continuous road traffic noise from a new or altered road associated with the DCO Project)
 5. Differences in the effects caused by the sources (for example the potential for night-time construction, where justified, to add sleep disturbance effects to daytime annoyance effects from road traffic noise)
 6. The duration of the combined exposure. This is relevant where one of the sources is construction noise or aircraft noise due to the early capacity release before the third runway becomes operational.
- 16.10.87 An assessment of combined effects, drawing on the above factors, would be reported in the on a receptor-by-receptor or area-by-area basis.

Cumulative effects

- 16.10.88 Cumulative noise and vibration effects resulting from the combination of effects from the DCO Project and other developments will be assessed in accordance with the approach set out in Section 4.5: Cumulative effects assessment.

Framework

- 16.10.89 The following sections set out the proposed approach for identifying significant effects from noise or vibration associated with construction and operation of the DCO Project. Where relevant to the DCO Project, evaluative criteria for direct, indirect, secondary, cumulative, permanent and temporary, short-, medium- and long-term, positive and negative effects are established for residential receptors and non-residential receptors and land uses. For noise sources, evaluative criteria for direct effects on 'quiet areas' are also established.



- 16.10.90 Graphics 16.3, 16.4, 16.5 and 16.6 summarise the evaluative criteria to be used to identify both significant effects on health and quality of life in terms of government noise policy and likely significant effects in terms of the EIA Regulations due to noise associated with the DCO Project. These evaluative criteria will be applied to all the noise sources in the assessment.
- 16.10.91 Thresholds for identifying these policy adverse effect levels are not defined numerically in any Government document save for aircraft noise where LOAEL values are set out in the Consultation Response to UK Airspace Policy¹⁰⁶ and UK Air Navigation Regulations¹⁰⁷. For each of the sources of noise (and vibration) considered (i.e. construction noise, aircraft noise, ground noise, road and rail noise, static sources and vibration), LOAEL and SOAEL values are defined in Table 16.7. The LOAEL and SOAEL values to be used in the assessment of likely significant effects, as referred to in Table 16.7 have been informed by a review of policy, standards, scientific evidence and previous projects. This evidence review will be published as a separate Technical Report on ‘adverse effect levels’ to accompany the PEIR.
- 16.10.92 *The Transport Analysis Guidance: WebTAG*¹⁰⁸ will be used, in line with the *Airspace Navigation Guidance 2017*, CAP1616 and transport project precedent, to monetise the effects of noise exposure associated with the DCO Project (refer to Graphic 16.3 and 16.4 for the evaluative criteria to be used in the noise assessment).

Evidence review

- 16.10.93 The assessment draws on an extensive evidence review which has been undertaken (and will be updated throughout the assessment period) to identify the health and quality of life effects associated with the noise sources scoped into the assessment. This review has identified the health and quality of life effects to be included in the assessment: annoyance, acute myocardial infarction, hypertension (including stroke and dementia), sleep disturbance, as well as disruption of function for specific settings, such as children’s learning in school environments. This evidence review on ‘noise effects on health and quality of life’ will be published as a separate Technical Note to accompany the PEIR.
- 16.10.94 The evidence review on noise effects on health and quality of life will identify the best-evidenced exposure-response function (ERF) to be used in conjunction with policy in the assessment for each health and quality of life outcome. ‘Best-evidenced’ is considered to include evidence from systematic reviews, where available, as well as individual studies carried out on samples around Heathrow or

¹⁰⁶ Department for Transport, UK Airspace Policy: a framework for the design and use of airspace, 2017

¹⁰⁷ Department for Transport, Air Navigation Guidance, 2017

¹⁰⁸ Department for Transport, Transport Analysis Guidance (WebTAG), December 2017



airports within the UK, as well as internationally important large-scale epidemiological studies. Exposure-response functions published in the recent systematic evidence reviews undertaken for the revision of the WHO's *Environmental Noise Guidelines* will be considered for use in the assessment¹⁰⁹, along with recent national publications such as the *Survey of Noise Attitudes 2014*¹¹⁰ and the *National Noise Attitude Survey 2012*¹¹¹. These ERFs will be used alongside the WebTAG methodology (refer to paragraph 16.7.5) and/or to provide sensitivity analysis, where appropriate).

- 16.10.95 The WHO is currently updating its Community Noise Guidelines (the replacement will be called the Environmental Noise Guidelines for the European Region) and these are expected to be published in mid-2018. The updated guideline values will be taken into account in the assessment as relevant either in terms of setting screening values or by way of sensitivity tests.
- 16.10.96 Where, in terms of government noise policy, the predicted noise (or vibration) newly exceeds the relevant SOAEL value, then the assessment will identify a significant adverse effect on health and quality of life at each receptor.

Residential receptors: Direct and indirect effects

Framework

- 16.10.97 Table 16.6 is based on the noise exposure hierarchy presented in PPGN¹¹², which is consistent with the revised draft ANPS¹¹³ and the NPPF and presents the overall framework for identifying significant effects for residential receptors.
- 16.10.98 Graphic 16.3 summarises the significance criteria to be used to identify both significant effects on health and quality of life in terms of government noise policy and likely significant effects in terms of the EIA Regulations due to noise associated with the DCO Project.

LOAEL and SOAEL values

- 16.10.99 Table 16.7 summarises the key noise exposure levels (LOAEL and SOAEL values) identified for the different phases, types of source and type of effect in the assessment for residential receptors.

¹⁰⁹ Special Issue "WHO Noise and Health Evidence Reviews
http://www.mdpi.com/journal/ijerph/special_issues/WHO_reviews (accessed 15 May 2018)

¹¹⁰ CAA, 2017c.

¹¹¹ Defra, 2014.

¹¹² DCLG, 2014.

¹¹³ DfT, 2017a.



Table 16.6 Illustration of LOAEL and SOAEL in the context of identifying likely significant effects on residential receptors (the interaction between government noise policy and the EIA requirements based on noise hierarchy table presented in the PPG-Noise¹¹⁴)

	PPG – Noise Noise Hierarchy (in line with NPPF and revised draft ANPS 5.67)			EIA Identification of likely significant effects		Noise Mitigation (ANPS 5.59 – 5.64)	Community Compensation (ANPS 5.243 – 5.245) (ANG 4.47 + Annex D)		
	Perception	Effect	Action	Assessment	Effect				
Increasing exposure of noise and vibration 	Not noticeable	No effect	No specific measures required	None	Adverse effect unlikely	Special cases only	None		
	Noticeable and not intrusive	No observe and adverse effect	No specific measures required						
	Lowest Observed Adverse Effect Level – LOAEL								
	Noticeable and intrusive	Observed adverse effect increasingly likely	Mitigate and minimise	Noise exposure + Change in noise exposure + Population + Additional factors Refer to Graphic 16.3	Change in exposure (increase or decrease) may cause adverse or beneficial effect on acoustic character of an area. May be identified as an EIA likely significant effect (adverse or beneficial) on an area basis (i.e. on a risk basis taking account of factors such as exposure, change and population exposed)	Maximise mitigation as far as sustainable	Voluntary Noise Insulation offer for aircraft noise	Community Compensation Fund	
	Significant Observed Adverse Effect Level – SOAEL								
	Intrusive and disruptive	Observed Significant adverse effect	Avoid	Noise exposure + Change in noise exposure + Additional factors Refer to Graphic 16.3	1) Significant adverse effect on health and quality of life on each receptor where newly exposed 2) May be identified as an EIA likely significant effect (adverse or beneficial) on each receptor where exposure currently exceeds SOAEL and the DCO Project changes exposure	Maximise mitigation as far as sustainable	Noise Insulation	Community Compensation Fund	
Intrusive and very disruptive	Unacceptable adverse effect	Prevent			Mitigate to prevent if possible	Assist with costs of moving ¹¹⁵			

¹¹⁴ DCLG, 2014.

¹¹⁵ There are several factors to take into consideration in relation to ‘assist with costs of moving’. a) In terms of temporary rehousing, BS5528: Construction Part 1 Annex E provides example thresholds for providing temporary rehousing or reasonable costs thereof, in relation to construction noise. The Noise and Insulation Regulations 1975 and Noise Insulation (Amendment) Regulations 1988 provide discretionary powers with regard to providing temporary rehousing with regard to the construction of new or altered railways or new or altered roads. b) In terms of permanent rehousing, para 2.48 of the ‘Consultation response on UK Airspace Policy’ specifies that ‘the government continues to expect airport operators to offer households exposed to 69dB LAeq,16h or more assistance with the costs of moving’ and requires an offer of full insulation to be paid for by the airport for homes within the 69dB LAeq,16h or greater contour, where home owners do not want to move. Further, Heathrow have set out a Wider Property Offer Zone (WPOZ) for eligible homeowners who live close to the boundary of the expanded airport but outside the Compulsory Purchase Zone, which provides assurance for owner-occupiers of eligible properties. If owners sign up to Heathrow’s bond they will receive the unaffected market value of their home and a 25% Home Loss Payment as well as their normal legal fees, moving costs and an equivalent stamp duty amount.



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Table 16.7 LOAEL and SOAEL levels to be used in the assessment for residential receptors

Source	Period	LOAEL and SOAEL criteria	
		Period noise level (outdoors, free-field ¹¹⁶)	Maximum noise level (outdoors, free-field ¹¹⁷)
Construction			
Site/Construction including borrow pits ^a	Daytime 0700 – 1900	LOAEL $L_{Aeq,T}$ >65dB SOAEL $L_{Aeq,T}$ >75dB	
	Evening 1900 – 2300 / Weekends	LOAEL $L_{pAeq,T}$ >55dB SOAEL $L_{pAeq,T}$ >65dB	
	Night time 2300-0700	LOAEL $L_{pAeq,T}$ >45dB SOAEL $L_{Aeq,T}$ >55dB	
Operation			
Airfield static	Day/Night time	6. Avoid likely significant effects by setting noise constraints set in line with BS 4142. ¹¹⁸	
Aircraft noise / aircraft ground noise	Daytime	LOAEL 51dB $L_{Aeq,16h}$ ^b SOAEL 63dB $L_{Aeq,16h}$ ^c	
	Night time	LOAEL 45dB $L_{Aeq,8h}$ ^b SOAEL 55dB $L_{Aeq,8h}$ ^d	L_{Amax} /number of events and a risk assessment of objective sleep disturbance
Road	Daytime	LOAEL 50dB $L_{Aeq,16h}$ ^e SOAEL 63dB $L_{Aeq,16h}$ ^f	
	Night time	LOAEL 40dB $L_{Aeq,8h}$ ^d SOAEL 55dB $L_{Aeq,8h}$ ^d	
Railway	Daytime	LOAEL 50dB $L_{Aeq,16h}$ ^e SOAEL 65dB $L_{Aeq,16h}$ ^g	
	Night time	LOAEL 40dB $L_{Aeq,8h}$ ^d SOAEL 55dB $L_{Aeq,8h}$ ^d	LOAEL L_{Amax} , 60 dB (any event) SOAEL L_{Amax} , 80dB (>20 pass-bys per night) or 85dB (< 20 pass-bys per night)

¹¹⁶ The noise level evaluated over relevant assessment period, outdoors at the façade of a noise sensitive receptor and measured in the absence of façade reflections.

¹¹⁷ When sound radiates from an object, it can either travel directly to the receiver in a straight-line or be reflected from other surfaces in the environment. Free-field is a situation where no reflections occur and only the direct sound is observed.

¹¹⁸ BSI, 2014.



Notes:

- a. BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: Noise. The LOAEL and SOAEL correspond to Category A and Category C of the 'ABC method' respectively.
- b. Department for Transport, Consultation Response on UK Airspace Policy: A Framework for balanced decisions on the design and use of airspace, Civil Aviation Authority (2017) CAP1616: Airspace Design: Guidance on the regulatory process for changing airspace design including community engagement requirements, 2017.
- c. Department for Transport, Aviation Policy Framework, 2013
- d. WHO, Night Noise Guidelines for Europe, 2009
- e. WHO, Guidelines for Community Noise, 1999
- f. Statutory Instrument No. 1763 (1974), The Noise Insulation Regulations 1975
- g. Statutory Instrument 1996 No. 428. The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.

Significance criteria

- 16.10.100 Graphic 16.3 sets out the significance criteria for identifying significant adverse effects on health and quality of life and also identifying likely significant effects in terms of the EIA Regulations.



Graphic 16.3 Evaluative criteria for noise for residential receptors

EVALUATIVE CRITERIA FOR RESIDENTIAL RECEPTORS

Please read in conjunction with Table 16.6

Evaluation 1) In line with Government noise policy (NPSE), where the calculated 'end state' exposure newly exceeds the relevant SOAEL values then a *significant adverse effect on health and / or quality of life* will be reported for each receptor affected taking account of noise insulation provided as part of Heathrow's committed community compensation package.

Evaluation 2) In line with the EIA Regulations, where the calculated 'end state' exposure lies above the relevant LOAEL value then *likely significant effects* (adverse or beneficial) may be identified either *on an area basis* or on individual dwellings (at exposures above SOAEL) taking account of the following factors for each DCO Project noise source being considered:

Primary factors (considered in combination)

1. The 'noise exposure' calculated for the DCO Project noise source under consideration compared^a to the relevant LOAEL values (refer to Table 16.7) evaluated using $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics
2. The magnitude of the 'change in noise exposure' for the source being considered (for example air traffic, road traffic, railway)^b (day or night / positive or negative) according to Table 16.8 evaluated using $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics
3. The magnitude of the 'population exposed' (i.e. number of people^c in the area exposed to the calculated 'noise exposure' and 'change in noise exposure').

Additional factors (in no particular order)

As part of identifying a likely significant effect on an area basis the following secondary factors may be considered as relevant:

1. The monetised value of the effect as evaluated using WebTAG^d
2. The calculated change in overall ambient noise (day or night / positive or negative) according to Table 16.8 assessed using $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics
3. Additional metrics in line with *Air Navigation Guidance 2017*, *CAP1616* and Airports Commission 'score card' (see
4. to take account of any particular or unusual character in the DCO Project noise or existing receiving environment
5. Noise insulation provided as part of the existing and future Heathrow's committed community compensation package (see paragraph 16.10.119 for details of future compensation package)
6. Other relevant qualitative information (for example, acoustic features of source and the receiving environment; duration of the exposure; vibration induced by airborne noise).

Notes:

^a For aircraft noise this is in line with UK Airspace Guidance 2017 (para 3.5)

^b Change in noise level for construction noise is accounted using the 'ABC' method 2 from Annex E of BS5228 Part 1 2008 + A1: 2014.

^c Greater weight will be given to change in exposure, even slight changes on individual dwellings, if the area is already exposed to existing levels of noise that exceed the relevant SOAEL values to reflect the increasing risk of health effects at these levels of exposure

^d For aircraft noise note UK Airspace Guidance 2017 (para 3.6)



Table 16.8 Categorising the magnitudes of change in noise exposure (positive or negative)
Please read in conjunction with Graphic 16.3 and Table 16.7

Noise change (decibels)	Illustrative Noise change descriptor
0	No change
0.1-0.9	Negligible
1.0 to 2.9	Slight
3.0-4.9	Minor
5.0-9.9	Moderate
>=10.0	Major

Table 16.9 Primary and additional noise metrics for use in the assessment¹ of noise at residential receptors (and non-residential receptors depending on the sensitivity and type of receptor).

Metric	Description
Primary metrics	
Daytime L_{Aeq,16hr}	92 day daytime (07:00-23:00) - overall summer average
	92 day daytime (07:00-23:00) summer average - easterly and westerly operating day
	Busy day - daytime (07:00-23:00) - 100% operating mode (single mode)
Nighttime L_{Aeq,8hr}	92 day night-time (23:00-07:00) - overall summer average
	92 day night-time (23:00-07:00) summer average - easterly and westerly operating day
	Busy day night-time (23:00-07:00) - 100% operating mode (single mode)
Lden	Annual



Metric	Description
Additional metrics	
N65 Number of events with a maximum noise level >65 dBA	92 day daytime (07:00-23:00) - overall summer average
	92 day daytime (07:00-23:00) summer average - easterly and westerly operating day
	Busy day - daytime (07:00-23:00) - 100% operating mode
N60 Number of events with a maximum noise level >60 dBA	92 day night-time (23:00-07:00) - overall summer average
	92 day night-time (23:00-07:00) summer average - easterly and westerly operating day
	Busy day night-time (23:00-07:00) - 100% operating mode
L_{Amax}	L _{Amax} for all aircraft types operating during the night-period for each runway
Overflights	CAA metric ¹¹⁹
Metric	Description
Primary metrics	
Daytime L_{Aeq,16hr}	92 day daytime (07:00-23:00) - overall summer average
	92 day daytime (07:00-23:00) summer average - easterly and westerly operating day
	Busy day - daytime (07:00-23:00) - 100% operating mode (single mode)
Nighttime L_{Aeq,8hr}	92 day night-time (23:00-07:00) - overall summer average
	92 day night-time (23:00-07:00) summer average - easterly and westerly operating day
	Busy day night-time (23:00-07:00) - 100% operating mode (single mode)
Lden	Annual
Additional metrics	
N65 Number of events with a maximum noise level >65 dBA	92 day daytime (07:00-23:00) - overall summer average
	92 day daytime (07:00-23:00) summer average - easterly and westerly operating day
	Busy day - daytime (07:00-23:00) - 100% operating mode
N60 Number of events with a maximum noise level >60 dBA	92 day night-time (23:00-07:00) - overall summer average
	92 day night-time (23:00-07:00) summer average - easterly and westerly operating day
	Busy day night-time (23:00-07:00) - 100% operating mode
L_{Amax}	L _{Amax} for all aircraft types operating during the night-period for each runway
Overflights	CAA metric ¹²⁰

¹¹⁹ CAP1498 Definition of an overflight. Civil Aviation Authority. 2017.

¹²⁰ CAP1498 Definition of an overflight. Civil Aviation Authority. 2017.



Evaluation 1 – Significant effects on health and quality of life, in line with Government noise policy (NPSE)

- 16.10.101 As described in Graphic 16.3, *significant adverse effects on health and/or quality of life* will be identified at every receptor (dwelling) when the relevant SOAEL value is newly exceeded due to the DCO Project, taking due account of the provision of noise insulation. This is in line with Government noise policy (NPSE) and Government decision making¹²¹. The consideration of noise insulation in the identification of likely significant effects is described later under ‘Additional factor #4’.

Evaluation 2 – Likely significant effects on an area basis, in line with EIA regulations

- 16.10.102 Likely significant effects (beneficial or adverse) – i.e. in line with the EIA Regulations - will be identified on an area or on individual receptors (where the existing exposure exceeds a relevant SOAEL value). Likely significant effects will be identified using three primary factors as set out in Graphic 16.3 and outlined further in the following paragraphs; all considered in combination:
- 16.10.103 Primary Factor #1, ‘Noise exposure’: The calculated noise exposure due to the DCO Project will be calculated using the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics (additional metrics are considered at Additional Factor #3). Where the calculated exposure exceeds the relevant LOAEL value in Table 16.7, a risk assessment will be undertaken to identify likely significant effects. This is in line with the *Air Navigation Guidance 2017* that sets out that “*It is possible to set a Lowest Observed Adverse Effect Level (LOAEL) that is regarded as the point at which adverse effects begin to be seen on a community basis. As noise exposure increases above this level, so will the likelihood of experiencing an adverse effect. In line with this increase in risk, the proportion of the population likely to be significantly affected can be expected to grow as the noise level increases over the LOAEL*”. This risk based approach is also in line with precedent from recent major road and rail consent decisions. The risk assessment will be informed by two further primary factors.
- 16.10.104 Primary Factor#2, ‘Change in noise exposure’: The magnitude of the calculated change in noise exposure will be evaluated using the semantic scale set out in Table 16.8. Greater weight will be given to change, even slight change, where the existing exposure already exceeds the relevant SOAEL, as discussed later.
- 16.10.105 Primary Factor #3, ‘Population’: In primary terms the larger the population exposed to a change in noise exposure the greater the aggregated effect is of a change in noise exposure due to the DCO Project.

¹²¹ Thames Water, Thames Tideway Tunnel. Application for Development Consent. Secretaries of State Decision letter and Statement for Reasons, September 2014



- 16.10.106 Primary factors #1, #2 and #3 will be considered in combination. In summary, once a relevant LOAEL value is exceeded the risk of noise impact due to the DCO Project increases with increasing noise exposure, increasing change in exposure and increasing population until the noise exposure itself becomes significant (i.e. the relevant SOAEL value is exceeded). When the exposure falls between the relevant LOAEL and SOAEL values, and hence noise exposure is not in itself significant in term of Government noise policy, a likely significant effect (adverse or beneficial) will therefore be identified in terms of the EIA Regulations in each area where, at extremes:
- A large population is subject to small noise change (increase or decrease)
 - A small population is subject to a large noise change (increase or decrease)
 - The relative scale of population and magnitude of noise change considered 'small' or 'large' are at their largest when the calculated noise exposure is just above the relevant LOAEL and are at their smallest when the exposure approaches the relevant SOAEL.
- 16.10.107 Once the calculated exposure exceeds the relevant SOAEL value, the risk of impact is considered on an individual receptor (dwelling) basis with increased weight given to even small changes in noise exposure to reflect the increasing risk of health effects at these levels of exposure.
- 16.10.108 Where the noise exposure is between the relevant LOAEL and SOAEL values, the combinations of the three primary factors that result in the identification of likely significant effects on an area basis is being developed drawing on the context of the communities within the study area. The combinations will be published and consulted on as part of the PEIR following review by NERG.
- 16.10.109 The ES will set out the factors that have led to the identification of every likely significant effect. The PEIR will report work in progress towards this outcome.
- 16.10.110 As set out in Graphic 16.3, the three primary factors to be used in combination to identify likely significant effects will be supported by a number of Additional criteria. These are described in more detail in the following paragraphs.
- 16.10.111 Additional factor #1, 'the monetised value of the noise effect using WebTAG': For aircraft noise, Air Navigation Guidance states "*The Department for Transport's WebTAG includes a module for valuing the impacts of noise, including those from changes in aircraft noise, on health and quality of life. It is not a comprehensive assessment of noise impacts as it is only currently possible to monetise these specific impacts based on average noise metrics. This approach does however allow decisions on transport schemes to take account of the costs and benefits of different options with regards to average noise contours in a consistent manner. The CAA must ensure that adverse effects of airspace change proposals are*



estimated in accordance with this methodology. Additional noise metrics should be considered, as appropriate, as specified elsewhere in this guidance, advised by the CAA, or following engagement by the sponsor.”

- 16.10.112 WebTAG valuations have also featured as a key component of the assessment of recent large road and rail schemes that have been publicly scrutinised and consented or enacted by Government (for example A14 Cambridge to Hunts Improvement and HS2 Phase 1).
- 16.10.113 In many respects WebTAG provides a single value measure of the aggregated effect across the three primary factors to be used to identify likely significant effects as described earlier. WebTAG valuations will therefore be used to inform and support the combinations of primary factors that will identify likely significant effects on an area basis.
- 16.10.114 In line with Air Navigation Guidance, Heathrow is preparing a ‘WebTAG+’ approach that takes into account updated exposure response functions (where there is a sufficient evidence base). The WebTAG+ methodology will be used to undertake sensitivity tests. The WebTAG+ method will be published and consulted on as part of Preliminary Environmental Information following review by NERG and engagement with the CAA.
- 16.10.115 Additional factor #2, ‘change in overall ambient noise’: Peoples’ perception of noise due to the DCO Project will be influenced by the noise level and character of the receiving environment created by sources not associated with the DCO Project. This may be of particular relevance in areas that will be newly over flown as a consequence of the DCO Project. The existing ambient noise levels and character of the receiving environments across the study area will be progressively collected, as set out in Section 16.3.
- 16.10.116 The ambient noise environment will be considered both quantitatively (noise level) and qualitatively (character) in combination with the calculated noise exposure from each DCO Project noise source. This additional information will be used to further guide the identification of likely significant effects on an area basis.
- 16.10.117 Consideration of the character of DCO Project noise sources and sources of ambient noise in the receiving environment will be informed by the use of additional noise metrics as described in the next paragraphs.

Additional factor #3, ‘additional noise metrics’: The additional noise metrics identified in *Air Navigation Guidance*¹²², *CAP1616*¹²³ and for example the Airports Commission’s noise ‘score card’ are set out in

¹²² DfT, 2017b.

¹²³ CAA, 2017a.



16.10.118 . These additional metrics could be used to support and refine the identification of likely significant effects on an area basis to reflect considerations such as the following:

1. Comparing ‘event’ noise exposure such as aircraft noise from the DCO Project with existing ‘steady state’ ambient noise associated with an existing trunk road
2. A large change in air traffic movements which leads to small noise increase or decrease as quantified using the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ primary metrics
3. Situations where aircraft noise exposure is characterised by a larger number of quieter air traffic movements and a smaller number of much louder air traffic movements that might influence community response but not lead to a large increase or decrease in the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ primary metrics
4. Factors, that could influence community response compared to the typical community exposure-response functions, such as perception of overflight.

16.10.119 Additional factor #4, ‘noise insulation’: Heathrow’s committed community compensation package includes a commitment to provide noise insulation, or assist with its cost, that goes substantially beyond the Government’s minimum expectation as set out in *Annex D of Air Navigation Guidance*¹²⁴. Heathrow’s committed community compensation package is set out in the revised draft ANPS (paragraph 5.243) and for residential property it is:

“Following a third-party assessment, to provide full acoustic insulation for residential property within the full single mode easterly and westerly 60dB L_{Aeq} (16 hr) noise contour of an expanded airport;

Following a third-party assessment, to provide a contribution of up to £3,000 for acoustic insulation for residential properties within the full single mode easterly and westerly 57dB L_{Aeq} (16hr) or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger”¹²⁵.

16.10.120 For aircraft noise, the provision of full acoustic insulation for residential property within the full single mode easterly and westerly 60dB $L_{Aeq,16h}$ noise contour of an expanded airport would provide insulation to all residential property that would be exposed to greater than the relevant SOAEL values (refer to Table 16.7).

16.10.121 For road and railway noise, the relevant statutory noise insulation regulations would provide noise insulation for residential property that would be exposed to greater than the relevant SOAEL values (refer to Table 16.7).

¹²⁴ DfT, 2017b.

¹²⁵ DfT, 2017a.



- 16.10.122 The provision of noise insulation where the exposure exceeds the relevant SOAEL avoids significant adverse effects on health and quality of life that would otherwise arise due to noise inside residential property.
- 16.10.123 At decreasing exposures below the relevant SOAEL, the installation of noise insulation in response to Heathrow’s commitment to “provide a contribution of up to £3,000 for acoustic insulation for residential properties within the full single mode easterly and westerly 57dB L_{Aeq} (16hr) or the full 55dB L_{den} noise contours of an expanded airport, whichever is the bigger” would remove residual adverse effects on health and quality of life (not significant in policy terms) that would otherwise arise due to noise inside residential property (for example night-time community annoyance due to aircraft noise).
- 16.10.124 The assessment will also take into account the existing residential noise insulation schemes, which have been in operation for many years and which cover over 40,000 properties. The current scheme, which has been in operation since 2014, is the Quieter Homes Scheme, for residents living closest to the airport, within the 69dB $L_{Aeq, 16h}$ contour.
- 16.10.125 Additional factor #5, ‘Other relevant qualitative information’: a number of other factors may be relevant in the assessment. For example, particular acoustic features of source and the receiving environment; the duration of the construction noise exposure; vibration induced by airborne noise, for example, the perception of airborne vibration within the home, such as windows rattling; and respite.

Identifying likely significant effects from aircraft noise

16.10.126 As set out earlier in this chapter the revised draft ANPS states:

“5.49 The Airports Commission’s assessment was based on ‘indicative’ flight path designs, which the Government considers to be a reasonable approach at this stage in the process.

Precise flight path designs can only be defined at a later stage after detailed airspace design work has taken place. This work will need to consider the various options available to ensure a safe and efficient airspace which also mitigates the level of noise disturbance.

Once the design work has been completed, the airspace proposal will be subject to extensive consultation as part of the separate airspace decision making process established by the Civil Aviation Authority.”

“5.51 The applicant’s assessment of aircraft noise should be undertaken in accordance with the developing indicative airspace design. This may involve the use of appropriate design parameters and scenarios based on indicative flightpaths.”¹²⁶

16.10.127 Whilst the assessment presented in the ES will identify likely significant effects arising from aircraft noise on a reasonably foreseeable worst-case basis, the

¹²⁶ DfT, 2017a.



assessment cannot identify the precise geographical location of such effects. These will be controlled and confirmed by the later airspace change approval process following further public consultation. Refer to Section 16.2: Policy and legislation, Section 16.7: Assumptions and limitations and Table 16.1.

- 16.10.128 The airspace design that supports an expanded Heathrow is the subject of a parallel consenting process. At the time of the DCO application the airspace design will not have been settled. Therefore, as set out in the revised draft ANPS, the noise assessment provided at the time of the DCO application will be based on indicative airspace design(s) formed within the airspace design envelope as available at the time of preparing the environmental assessments during the DCO process (PEIR and ES).
- 16.10.129 At the time of DCO application there will therefore be a degree of uncertainty of the geographical pattern of noise exposure from airborne aircraft operations. For those that are overflowed in the final airspace design, the mitigation embedded into the design of the DCO Project and the airports concept of operation (such as runway alternation pattern) will apply.
- 16.10.130 At the time of the DCO application the assessment will make use of a number of indicative airspace design options within the Airspace Design Envelope available at that time. These will be used to identify the significant effects on an area basis for each of the indicative flight path design options and performance with respect to the relevant policy and requirements.
- 16.10.131 The assessment will identify areas where noise exposure is considered to be broadly similar irrespective of the indicative airspace design. At a range from the airport where the noise exposure is common across designs the assessment methodology summarised in Graphic 16.3 would be used to identify the likely significant effects and compliance with relevant policy requirements. The geography of common exposure would be established.
- 16.10.132 Beyond the area of common noise exposure, the pattern of noise exposure is geographical, and therefore likely significant effects are mostly determined by the airspace design and therefore controlled by the ACP. Beyond the common noise exposure area, the geographical pattern and extent of exposure cannot be confirmed at the time of DCO.
- 16.10.133 Therefore, beyond the area of common exposure, the assessment methodology summarised in Graphic 16.3 would be used to identify the range of likely significant effects (adverse or beneficial) and range of performance with respect to policy and requirements on an area basis based on the range of indicative airspace design test cases available at that time.



- 16.10.134 In line with Air Navigation Guidance and CAP1616 the range of monetised values of noise effects associated with the indicative flight path options will be quantified using WebTAG and a range presented on a non-geographical basis
- 16.10.135 Airspace design will continue to evolve following the DCO process. The methodology associated with noise assessment at DCO would be applied through the ACP to ensure consistency of assessment.
- 16.10.136 The Noise Envelope, which is a requirement of the revised draft ANPS will set out the framework and binding process within which ACP will provide confirmed geographical information and ensure the aims of noise policy (NPSE)¹²⁷ are met.

Non-residential receptors - Direct and indirect effects

Screening criteria

- 16.10.137 The approach to assessing likely significant effects due to noise at non-residential receptors necessarily differs from that adopted for residential receptors. This is because government policy for managing noise at residential receptors is drawn on community exposure response information and the noise insulation of typical residential dwellings. Acoustics design guide values for non-residential receptors are however set, usually indoors, for each generic type of receptor (for example schools). Additionally, the design and layout of a non-residential receptor varies widely with each generic type of receptor (for example every school is different in its layout, design and hence sensitivity to noise impact from a new or changed noise source).
- 16.10.138 For non-residential receptors and land-uses the screening criteria set out in Table 16.10 will be used to identify where there is the potential for significant effects to occur. Note that the screening criteria do not identify that there will be a likely significant effect. These screening criteria are used to determine which non-residential receptors and land-uses will get scoped into the assessment. Screening is therefore undertaken on a precautionary basis and where receptors are 'screened in' they will be subject to a receptor specific assessment. This approach is necessary as there are wide variations in layout, design, use and hence noise sensitivity of different receptors within the same non-residential receptor class (for example schools).

¹²⁷ Defra, 2010.



16.10.139 These screening criteria are drawn from a range of policy and guidance sources including the WHO *Community Noise Guidelines* (1999)¹²⁸, the WHO *Night Noise Guidelines*¹²⁹, and the UK Noise Insulation Regulations¹³⁰.

Table 16.10 Screening criteria to identify noise sensitive non-residential buildings and land uses that require a receptor specific assessment

Setting	Noise level (outdoors, free-field)	
	Day (07:00-23:00)	Night (23:00-07:00)
Large and small auditoria; concert halls; sound recording and broadcast studios; and theatres ^a	60dB L _{AFMax} or 50dB L _{Aeq, 16h}	60dB L _{AFMax} or 50dB L _{Aeq, 8h}
Places of meeting for religious worship; courts; cinemas; lecture theatres; museums; and small auditoria or halls ^b	50 dB L _{Aeq, 16h}	N/A
Hospitals; and hotels ^{30, 31}	50 dB L _{Aeq, 16h}	45dB L _{Aeq, 8h} ^c
Schools; colleges; and libraries ³⁴	50 dB L _{Aeq, 16h}	N/A
Offices ^d	55 dB L _{Aeq, 16h}	N/A
External amenity spaces ^e	55 dB L _{Aeq, 16h}	N/A

Notes:

- a. Based on an internal level of 25 L_{Aeq,T} and 35 dB L_{Amax} consistent with BS8233. To require these criteria the internal sound levels due to existing sources (internal and external) must already be reduced to these criteria or lower. Given typical environments this would suggest any such receptor would have a level of sound insulation from the building shell (including windows and ventilation penetrations) that would reduce external levels by at least 25 to 30 dB.
- b. Based on an internal level of 35 dB L_{Aeq,T} consistent with Building Bulletin 93 and BS8233¹³¹. Equivalent external level assuming 10-15 dB for a partially open window.
- c. Based on an internal level of 30 dB L_{Aeq,T} consistent with BS8233, WHO guidelines. Equivalent external level assuming 10-15 dB for a partially open window.
- d. Based on an internal level of 40 dB L_{Aeq,T} consistent with BS8233, BCO guidelines etc. Equivalent external level assuming 10-15 dB for a partially open window.
- e. Based upon guidance from WHO *Guidelines for community noise*

¹²⁸ WHO, Guidelines for Community Noise, 1999 (WHO, 1999).

¹²⁹ WHO, Night Noise Guidelines for Europe, 2009 (WHO, 2009).

¹³⁰ Statutory Instrument 1996 No. 428. The Noise Insulation (Railways and Other Guided Transport Systems) Regulations, 1996.

¹³¹ British Standards Institute, BS 8233: 2014. Guidance on sound insulation and noise reduction for buildings (BSI, 2014b).



Significance criteria

- 16.10.140 For non-residential receptors and land uses, if the screening criteria are exceeded, the likely significance of the effect (beneficial or adverse) i.e. in line with the EIA Regulations will then be determined on a receptor by receptor basis taking into account a range of primary and additional factors as set out in Graphic 16.4 and outlined further in the following paragraphs; all are considered in combination.

Graphic 16.4 Evaluative criteria for noise for non-residential receptors

EVALUATIVE CRITERIA FOR RECEPTOR SPECIFIC ASSESSMENT OF NON-RESIDENTIAL RECEPTORS

In line with the EIA Regulations, where the calculated 'end state' exposure lies above the relevant policy, standards and guidelines then (adverse or beneficial) *likely significant effects on a receptor* may be identified taking account of the following factors for each noise source being considered:

Primary factors (considered in combination)

1. Whether the calculated airborne sound exceeds the screening criteria (Table 16.10), and if so the calculated 'noise exposure' (for example. air traffic, road traffic, railway) (day or night / positive or negative) for the DCO Project noise source under consideration evaluated using $L_{Aeq, 16h}$ and/or $L_{Aeq, 8h}$ metrics to reflect the use and sensitivity of the receptor
2. The magnitude of the 'change in noise exposure' for the source being considered (for example air traffic, road traffic, railway) (day or night / positive or negative) evaluated using Table 16.8 evaluated using $L_{Aeq, 16h}$ and/or $L_{Aeq, 8h}$.

Additional factors (in no particular order)

As part of identifying a likely significant effect on a receptor the following additional factors may be considered as relevant:

3. The calculated change in overall ambient noise for the receptor (day or night / positive or negative) according to Table 16.8 evaluated using Table 16.8 evaluated using $L_{Aeq, 16h}$ and/or $L_{Aeq, 8h}$.
4. The design of the receptor affected
5. Additional metrics in line with *Air Navigation Guidance 2017*, *CAP1616* and Airports Commission 'score card' (refer to Table 16.9) to take account of any particular or unusual character in the DCO Project noise or existing receiving environment
6. For construction noise impacts, the frequency and duration over which temporary construction impacts may occur
7. Noise insulation provided as part of Heathrow's committed community compensation package.



Primary factors

- 16.10.141 Primary Factor #1, 'Noise exposure': Where the screening criteria are met, the noise exposure due to the DCO Project will be calculated using the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ metrics to reflect the use and sensitivity of the receptor.
- 16.10.142 Primary Factor #2, 'Change in noise exposure': The magnitude of the calculated noise exposure will be evaluated using the semantic scale set out in Table 16.8. Greater weight will be given to change, even slight change, where the existing exposure already exceeds the relevant SOAEL.
- a) Primary factors #1 and #2 will be considered in combination. A likely significant effect (adverse or beneficial) will therefore be identified in terms of the EIA Regulations for a receptor where, a receptor is subject to a large noise change (increase or decrease) or where the evidence-review suggests that the effect at the calculated noise levels is adverse.
- 16.10.143 The ES will set out the factors that have led to the identification of every likely significant effect. The PEIR will report work in progress towards this outcome.

Additional factors

- 16.10.144 As set out in Graphic 16.4, the primary factors to be used in combination to identify likely significant effects will be supported by a number of additional factors. These are described in more detail in the following paragraphs.
- 16.10.145 Additional factor #1 'Calculated change overall ambient noise': Peoples' perception of noise due to the DCO Project will be influenced by the noise level and character of the receiving environment created by sources not associated with the DCO Project. This may be of particular relevance in areas that will be newly overflowed as a consequence of the DCO Project. The existing ambient noise levels and character of the receiving environments across the study area will be progressively collected as set out in Section 16.3.
- 16.10.146 The ambient noise environment will be considered both quantitatively (noise level) and qualitatively (character) in combination with the calculated noise exposure from each DCO Project noise source. This additional information will be used to further guide the identification of likely significant effects for each receptor.
- 16.10.147 Consideration of the character of DCO Project noise sources and sources of ambient noise in the receiving environment will be informed by the use of additional noise metrics as described in the following paragraphs.
- 16.10.148 Additional factor #2, 'design of the receptor': the assessment will take into account the current design of the receptor.



- 16.10.149 Additional factor #3, ‘additional noise metrics’: The additional noise metrics identified in *Air Navigation Guidance*¹³², *CAP1616*¹³³ and for example the Airports Commission’s noise ‘score card’ are set out in Table 16.9. These additional metrics could be used to support and refine the identification of likely significant effects for a receptor to reflect considerations such as the following:
1. Comparing ‘event’ noise exposure such as aircraft noise from the DCO Project with existing ‘steady state’ ambient noise associated with an existing trunk road
 2. A large change in air traffic movements which leads to small noise increase or decrease as quantified using the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ primary metrics
 3. Situations where aircraft noise exposure is characterised by a larger number of quieter air traffic movements and a smaller number of much louder air traffic movements that might influence community response but not lead to a large increase or decrease in the $L_{Aeq,16h}$ and $L_{Aeq,8h}$ primary metrics
 4. Factors such as new over flight or removal of over flight, that can influence community response compared to the typical community exposure-response information.
- 16.10.150 Additional factor #4, ‘construction noise duration and frequency’: The assessment will consider the frequency and duration over which temporary construction impacts may occur.
- 16.10.151 Additional factor #5, ‘noise insulation’: Heathrow’s future committed community compensation package includes a voluntary commitment to provide noise insulation or assist with its cost, that goes substantially beyond the Government’s minimum expectation as set out in Annex D of Air Navigation Guidance. In terms of non-residential receptors, the revised draft ANPS indicates that “*the applicant will be required to commit appropriate resources to mitigate the impacts of aircraft through noise insulation programmes for both private homes and public buildings such as schools.*” (paragraph 5.238)¹³⁴. Public buildings, i.e. non-residential receptors as described in Table 16.10 would be included within the proposed community compensation package.
- 16.10.152 The assessment would also take into account noise insulation already provided to non-residential receptors through its existing Community Building Noise Insulation Scheme.

¹³² DfT, 2017b.

¹³³ CAA, 2017a.

¹³⁴ DfT, 2017a.



Quiet Areas - Direct effects

Screening criteria

16.10.153 'Quiet areas' comprise:

1. Areas designated under Local Plans or Neighbourhood Development Plans as Local Green Spaces recognised for their quietness, acoustic quality or tranquillity
2. Areas identified as Quiet Areas through implementation of the Environmental Noise Regulations¹³⁵.

16.10.154 The Local Plans and Neighbourhood Development Plans of areas located within or near to the 51dB $L_{Aeq,16h}$ aircraft LOAEL will be considered on a receptor specific basis based on the criteria defined in the relevant Local Plan or Neighbourhood Development Plan. There are currently no Quiet Areas identified through implementation of the Environmental Noise Regulations in England.

Significance criteria

Factors to be used in identifying likely significant effects

16.10.155 Effects on 'quiet areas' or other resources that are valued for their acoustic related characteristics will be assessed on a receptor by receptor basis having regard to the following factors:

1. The calculated 'noise exposure' (for example air traffic, road traffic, railway) (day or night / positive or negative) for the DCO Project noise source under consideration evaluated using $L_{Aeq,16h}$ and/or $L_{Aeq,8h}$ metrics to reflect the use and sensitivity of the receptor
2. The magnitude of the 'change in noise exposure' for the source being considered (for example air traffic, road traffic, railway) (day or night / positive or negative) according to Table 16.8 using $L_{Aeq,16h}$ and/or $L_{Aeq,8h}$
3. The calculated change in overall ambient noise for the receptor (day or night / positive or negative) according to Table 16.8 assessed using $L_{Aeq,16h}$ and/or $L_{Aeq,8h}$

Additional metrics in line with *Air Navigation Guidance 2017*¹³⁶, *CAP1616*¹³⁷ and Airports Commission 'score card' (refer to

¹³⁵ Environmental Noise (England) Regulations 2006

¹³⁶ DfT, 2017b.

¹³⁷ CAA, 2017a.



4.) to take account of any particular or unusual character in the DCO Project noise or existing receiving environment
5. The duration over which temporary construction impacts may occur.

16.10.156 These factors for assessing significance in EIA terms for quiet areas have already been described in the previous sections for residential and non-residential receptors.

Vibration - residential: direct, indirect and secondary effects

LOAEL and SOAEL values

16.10.157 Table 16.11 summarises the key noise and vibration exposure levels (LOAEL and SOAEL values) identified for the different phases, types of vibration source and type of effect in the assessment for residential receptors.

Table 16.11 Ground-borne noise and vibration effect levels for permanent residential buildings during construction and operation

Source	Significance	Noise metric or time of day	Noise or vibration value
Noise			
Ground-borne noise ^a	LOAEL	L _{ASMax}	35 dB L _{ASMax}
	SOAEL	L _{ASMax}	45 dB L _{ASMax}
Vibration			
Vibration – annoyance ^b	LOAEL	Daytime (07:00-23:00)	0.2 VDV m/s ^{1.75}
		Night time (23:00 – 07:00)	0.1 VDV m/s ^{1.75}
	SOAEL	Daytime (07:00-23:00)	0.8 VDV m/s ^{1.75}
		Night time (23:00 – 07:00)	0.4 VDV m/s ^{1.75}
Vibration – damage to potentially vulnerable buildings ^c		PPV	3 mm/s
Vibration – damage to structurally sound buildings ^c		PPV	6 mm/s
a. from High Speed Two Phases 1 and 2a b. From BS6472-1 ¹³⁸ c. From BS7385-2 ¹³⁹			

¹³⁸ BSI, 2008.

¹³⁹ BSI, 1993.



Significance criteria - residential

- 16.10.158 As described in Graphic 16.5, significant adverse effects on health and/or quality of life will be identified at every residential receptor (dwelling) when the relevant SOAEL value is newly exceeded as a result of the DCO Project. This is in line with Government noise policy and Government decision making (reference Thames Tideway DCO decision letter).
- 16.10.159 Likely significant effects (beneficial or adverse) - in accordance with the EIA Regulations - will be identified on an area or on individual receptors (where the existing exposure exceeds a relevant SOAEL value). Likely significant effects will be identified using the six factors as set out in Graphic 16.5 all considered in combination.

Graphic 16.5 Evaluative criteria for vibration for residential receptors

EVALUATIVE CRITERIA FOR RESIDENTIAL RECEPTORS FOR USE WHERE VIBRATION EXPOSURE LIES BETWEEN LOAEL AND SOAEL

Evaluation 1) In line with Government noise policy (NPSE), where the calculated 'end state' exposure newly exceeds the relevant SOAEL values then a *significant adverse effect on health and / or quality of life* will be reported for each receptor affected.

Evaluation 2) In line with the EIA Regulations, where the calculated 'end state' exposure lies above the relevant LOAEL value the *likely significant effects* (adverse or beneficial) may be identified either on an area basis or on individual dwellings (at exposures above SOAEL) taking account of the following factors for each DCO Project noise source being considered:

- a) The magnitude of the effect (i.e. the calculated noise or vibration level compared with the relevant LOAEL and SOAEL values and available exposure-response information)
- b) The change in vibration level where relevant as classified using Table 16.12.
- c) The number and grouping of residential receptors affected
- d) Any unique features of the DCO Project's noise or vibration in the area being considered (which may require secondary acoustic indicators/criteria)
- e) The frequency and duration over which temporary construction impacts may occur
- f) The effectiveness of mitigation through design or other means.



Table 16.12 Vibration change criteria for the assessment of disturbance (annoyance) of occupants and building users

Change classification	Impact criteria where appreciable existing levels of vibration exceed LOAEL
	% increase or decrease in VDV
Negligible	≤ 25
Minor	25 to 40
Moderate	> 40, to 100
Major	>100

Vibration – non-residential: direct, indirect and secondary effects

Screening criteria

- 16.10.160 For non-residential receptors and land-uses screening criteria as set out in Table 16.13 and Table 16.14 will be used to identify where there is potential for significant effects to occur.
- 16.10.161 Note that the screening criteria do not identify that there will be a likely significant effect. These screening criteria are used to determine which non-residential receptors and land-uses will get scoped into the assessment.
- 16.10.162 Screening is therefore undertaken on a precautionary basis and where receptors are ‘screened in’ they will be subject to a receptor specific assessment. This approach is necessary as there are wide variations in layout, design, use and hence noise sensitivity of different receptors within the same non-residential receptor class (for example schools).

Table 16.13 Ground-borne noise screening criteria for non-residential receptors

Category of building	Screening criterion dB L _{ASmax} (predicted inside the noise sensitive part of the receptor)
Theatres / large auditoria and concert halls	25
Sound recording / broadcast studios	30
Places of meeting for religious worship / courts / cinemas lecture theatres / museums / small auditoria or halls	35
Offices / schools / colleges / hospitals / hotels / libraries	40



Table 16.14 Ground-borne vibration screening criteria for non-residential receptors

Category of building	Screening criteria	
Examples	VDV _{day} m/s ^{1.75}	VDV _{night} m/s ^{1.75}
Hotels; hospital wards; and education dormitories	0.2	0.1
Offices; Schools; and Places of Worship	0.4	n/a
Workshops	0.8	n/a
Vibration sensitive research and manufacturing (for example computer chip manufacture); hospitals with vibration sensitive equipment / operations; universities with vibration sensitive research equipment / operations	Risk assessment will be undertaken based on the information currently available for the relevant equipment / process, or where information provided by the building owner or equipment manufacturer.	

Significance criteria – non-residential

16.10.163 For non-residential receptors, likely significant effects will be determined on a receptor by receptor basis taking into account the evaluative criteria set out in Graphic 16.6. The primary factors to be used in combination to identify likely significant effects will be supported by a number of additional factors. These are described in more detail in the following paragraphs.

Graphic 16.6 Evaluative criteria for vibration for non-residential receptors

EVALUATIVE CRITERIA FOR NON-RESIDENTIAL RECEPTORS FOR USE WHERE VIBRATION EXPOSURE LIES BETWEEN LOAEL AND SOAEL

In line with the EIA Regulations, where the calculated ‘end state’ exposure lies above the relevant policy, standards and guidelines then (adverse or beneficial) *likely significant effects on a receptor* may be identified taking account of the following factors for each noise source being considered:

1. The use and sensitivity of the receptor
2. Whether the calculated magnitude of ground-borne noise or vibration exceed the screening criteria set out in Table 16.13 and Table 16.14 and then:
 - a) The design of the receptor affected
 - b) The existing ambient noise and vibration levels in the receptor affected
 - c) Any unique features of the DCO Project’s sound or vibration impacts in the area being considered (which may require secondary acoustic indicators/criteria)
 - d) For construction impacts, the frequency and duration over which temporary construction impacts may occur
 - e) The effectiveness of mitigation through design or other means.



16.11 Approach to mitigation

16.11.1 The EIA Regulations provides a framework of how mitigation will be incorporated into the development proposals depending on the increasing severity of the noise/vibration impact and in the context of government noise policy.

Construction

16.11.2 A draft CoCP will be developed for the DCO Project.

16.11.3 The draft CoCP will set out control measures and standards of work, which shall be applied by Heathrow and its contractors throughout the construction period to:

1. Provide effective planning, management and control during construction to avoid and minimise adverse potential effects upon people, businesses and the natural and historic environment
2. Provide the mechanisms to engage with local authorities and their representatives throughout the construction period.

16.11.4 Specific to noise, the draft CoCP to be included with the DCO will describe the steps to be taken to minimise construction noise and vibration including:

1. A requirement to use BPM to minimise noise and vibration at neighbouring residential properties and other sensitive receptors arising from construction sites
2. A requirement for contractors to seek and obtain consents from the relevant local authority under Section 61 of the Control of Pollution Act 1974 for the proposed construction works, excluding non-intrusive surveys
3. A policy to provide noise insulation and, if required, temporary re-housing in line with the guidance presented in *Annex E of BS5228-1*¹⁴⁰.

16.11.5 Noise insulation and temporary re-housing will be used as a method of last resort to avoid significant negative effects and minimise adverse effects and prevent unacceptable effects of construction noise and vibration.

Operation

16.11.6 Mitigation measures will be assessed and incorporated into the DCO Project to address the permanent operational effects arising from aircraft in the air and on the ground (including noise from aircraft maintenance). The revised draft ANPS sets out the need to 'strike a fair balance between the negative impacts of noise

¹⁴⁰ BSI, 2014a.



(on health, amenity, quality of life and productivity) and the positive impacts of flight (paragraph 5.46).

- 16.11.7 Mitigation measures will be developed in accordance with the principles of the ICAO's *Guidance on the Balanced Approach to Aircraft Noise Management* (2008)¹⁴¹, which is given legal effect in the UK through EU Regulation 598/2014¹⁴². As such, the proposed mitigation measures will seek to sustainably balance 'the need to consider various measures available, as appropriate, according to the assessment made of the evolution in the noise situation at each airport with a view to achieve maximum environmental benefit most cost-effectively while preserving potential benefits gained from aircraft-related measures¹⁴³. The priorities for mitigation are therefore as follows:
1. Reduction of noise at source
 2. Land use planning and management
 3. Noise abatement operational procedures
 4. Operating restrictions.
- 16.11.8 These principles apply to the requirements for mitigation to minimise the effects of noise on health and quality of life as set out in the revised draft ANPS and Airspace Policy (and associated guidance documents *CAP1616*)¹⁴⁴ ¹⁴⁵.
- 16.11.9 A brief summary of the mitigation elements being considered is presented below (it is noted that this is not an exhaustive list - others may arise through the development and consultation process):
1. Airport masterplan design. Elements of the design and layout of the ground based airport development to minimise noise effects, as far as reasonably practical. For example – runway length, runway position and displaced thresholds for air noise; taxiway locations, bunding, barriers and landscaping for ground noise
 2. Airport operating procedures – development of proposals for a runway alternation scheme that provides predictable periods of respite from aircraft noise and consideration of principles to enable alternatives for sharing of noise exposure (for example preference for operating direction)

¹⁴¹ International Civil Aviation Organization, *Guidance on the Balanced Approach to Aircraft Noise Management*, ICAO 9829 AMD 1, 2008

¹⁴² EU Regulation 598/2014 (on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC), 2014

¹⁴³ ICAO 9829 AMD 1, 2008.

¹⁴⁴ CAA, 2017a.

¹⁴⁵ Civil Aviation Authority, CAP 1520: Draft Airspace Design Guidance, March 2017 (CAA, 2017b)



3. Minimising the effects of noise from night flights. Consideration of the proposed ban on scheduled night flights for a 6.5hr period (time to be agreed through consultation) between 23:00 and 07:00, the fleet that operates and the way in which the operator uses the available runways
 4. Land use planning and management. Proposals for community compensation including a noise insulation scheme (residential and community buildings including schools) and a home relocation assistance scheme
 5. Airspace design and operation. Consideration of both the airspace design and the components that are enabled by the airspace design (for example continuous descent approach, continuous climb, approach profile, aircraft operating procedures). Whilst airspace design will be controlled through the ACP, the ES will present indicative airspace design solutions in order to allow a proper assessment of 'likely significant effects' of the third runway.
 6. Development of a Noise Envelope which is a framework for the control of the effects of noise that provides certainty to industry and communities about how noise will be managed to comply with Government policy, balancing growth and noise reduction, for the long term. This would include a set of aims and principles, performance targets, evaluation criteria (and method), the mitigation measures to be applied as considered necessary and a review period. This is to be developed in consultation and engagement with stakeholders and local communities.
- 16.11.10 Mitigation measures will become requirements within the DCO. These requirements and other outcomes (including any non-geographic constraints and noise performance targets that may arise through the Noise Envelope) will then pass to the airspace change process. Geographical aspects of the envelope framework will then be formalised through the airspace change approvals process as per *CAP 1520*¹⁴⁶. Following completion of that process and at opening, mitigation associated with the airport and airspace design and operating procedures will be incorporated into the UK Aerodrome Information Publication (UK AIP).
- 16.11.11 Whilst the overall approach will be based on the ICAO Balanced Approach, the Noise Envelope and associated mitigation measures will then be an integral part of Heathrow's approach to noise management into the future as set out in the Noise Action Plan (including, as appropriate, meeting the obligations of the Environmental Noise (England) Regulations 2006¹⁴⁷).

¹⁴⁶ CAA, 2017b.

¹⁴⁷ Environmental Noise (England) Regulations 2006



Chapter 17

Traffic and transport



Heathrow Expansion

EIA Scoping Report – Chapter 17: Traffic and transport

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17. TRAFFIC AND TRANSPORT

17.1 Introduction

- 17.1.1 This chapter describes the scope of the assessment as it relates to traffic and transport. The chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 17.1.2 This chapter describes:
1. The traffic and transport policy and legislative context
 2. Topic specific stakeholder engagement so far and future proposed engagement
 3. Study area for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the DCO Project on traffic and transport
 7. Effects not requiring assessment
 8. The proposed approach to the assessment
 9. Approach to mitigation.
- 17.1.3 This chapter covers all modes of surface transport using the public highway and public transport networks including:
1. Private vehicle movements, to include freight
 2. Construction movements
 3. Private hire and taxis
 4. Public buses
 5. Coaches
 6. Rail
 7. Walking and cycling adjacent to the public highway only.
- 17.1.4 Use of off-road footpaths and cycle routes is not considered within this chapter and is instead covered in **Chapter 9: Community**.
- 17.1.5 The assessment will consider all users of the highway and public transport networks across these modes, regardless of their trip purpose.



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Wider assessment of transport

- 17.1.6 Transport is a key topic for the DCO Project, which is addressed through a portfolio of technical work. This includes:
1. This traffic and transport Environmental Impact Assessment (EIA) Scoping Report
 2. A Transport Assessment (TA)
 3. Surface access transport modelling
 4. The development of a Surface Access Strategy (SAS).
- 17.1.7 The relationship between these tasks and their relationship and interface specifically with the traffic and transport EIA is described below.
- 17.1.8 The revised draft Airports National Policy Statement (revised draft ANPS) requires that the applicant prepares a SAS to detail how surface access to and from the expanded airport will function and be managed. The revised draft ANPS also sets out a series of targets and requirements for surface access outcomes and requires that the applicant demonstrates how these can be achieved through the SAS.
- 17.1.9 By delivering the outcomes set out in the revised draft ANPS, the SAS acts as one form of mitigation for the effects of the expanded airport upon surface access transport networks resulting its development, implementation and operation.
- 17.1.10 The revised draft ANPS requires the applicant to develop the SAS in conjunction with the Heathrow Airport Transport Forum – a group of key stakeholders with an interest in surface access issues. The effects of the DCO Project including the mitigation within the SAS will be analysed using a suite of transport modelling tools to demonstrate that the package of measures that is developed for inclusion in the DCO Project is capable of achieving the targets and requirements set out in the revised draft ANPS.
- 17.1.11 The modelling suite covers highway and public transport modes and is being developed in consultation with key stakeholders and following best practice guidance including WebTAG¹. Information on how the modelling has been used to determine the study area for the traffic and transport assessment is provided in Section 17.4: Study areas.
- 17.1.12 In addition to being used to inform the development of the SAS, the modelling suite will provide information to inform the TA, the traffic and transport EIA, and also other assessments in the EIA such as those for air quality and noise.

¹ DfT Transport Analysis Guidance: WebTAG <https://www.gov.uk/transport-analysis-guidance-webtag> (accessed 09 February 2018)



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- 17.1.13 While the role the SAS will play in mitigating effects is discussed in 17.10, the activities specifically being undertaken to develop the SAS are not covered within this chapter of the Scoping Report. The development of the SAS will be discussed separately with key stakeholders as it emerges.
- 17.1.14 Separate to the traffic and transport EIA, Heathrow is preparing a TA to assess the impact of the DCO Project upon the operation of the surface access network, considering both construction and operational aspects of the DCO Project.
- 17.1.15 The TA will be developed in light of relevant best practice guidance and feedback from stakeholders and its scope will be developed in the light of such guidance and feedback. The TA will be produced in parallel to the traffic and transport EIA, and the two assessments will draw upon a shared technical base including baseline evidence and modelling data. However, the TA and EIA are separate assessments with different objectives and outcomes. The scope of the TA is therefore not covered within this Scoping Report and will be discussed separately with stakeholders.

Traffic and transport in the EIA

- 17.1.16 The role of the traffic and transport EIA chapter within the wider body of surface transport work is to assess the following transport effects of the DCO Project from the point of view of those receptors exposed to them (compared to the TA which considers some of these but from a network impact point of view):
1. Highway network delay
 2. Driver stress and view from the road
 3. Pedestrian and cyclist delay
 4. Pedestrian and cyclist amenity
 5. Severance (the obstruction of access by changes in travel conditions)
 6. Public transport amenity
 7. Accidents and safety.
- 17.1.17 These effects reflect the requirements of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 for the EIA to assess the effects of the DCO Project on a range of factors including the human population. More information on the assessment of each of these topics is provided in Section 17.9: Proposed approach to the assessment.



17.2 Policy and legislation

- 17.2.1 This section identifies the relevant policy and legislation which have informed the scope of the assessment presented in **Chapter 17: Traffic and transport**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.
- 17.2.2 The policies relevant to the traffic and transport assessment methodology are detailed in Table 17.1.

Table 17.1 Policy relevant to the traffic and transport assessment

Relevant policy / legislation	Relevance to the assessment
Policy – UK	
<p>Revised draft Airports National Policy Statement (revised draft ANPS)²</p>	<p>This document sets out the future years of assessment for considering the effect of the Project from a transport perspective. Paragraph 5.16 specifies that the Project must achieve a public transport mode share of at least 50% by 2030, and at least 55% by 2040 for passengers as well as a 25% reduction of all staff car trips by 2030, and a reduction of 50% by 2040 from a 2013 baseline level.</p> <p>The 'surface access' section (paragraphs 5.5 – 5.21) specifies that the applicant is required to prepare a SAS which must be submitted with the DCO application. Paragraph 5.8 specifies that <i>"The airport surface access strategy must contain specific targets for maximising the proportion of journeys made to the airport by public transport, cycling or walking. The strategy should also contain actions, policies and defined performance indicators for delivering against targets, and should include a mechanism whereby the Airport Transport Forum can oversee implementation of the strategy and monitor progress against targets alongside the implementation and operation of the preferred scheme"</i>.</p> <p>In terms of assessment, paragraph 5.9 requires the applicant to assess the implications of airport expansion on surface access network capacity using the WebTAG methodology stipulated in the Department for Transport guidance.</p> <p>To meet this requirement, the TA will consider the effectiveness of the SAS on minimising effects upon the surface access network from a network functionality and perspective, and the EIA will consider the environmental effects associated with this.</p> <p>Paragraph 5.9 also states that <i>"The applicant should consult Highways England, Network Rail and highway and transport</i></p>

² Department for Transport, Revised Draft Airports National Policy Statement, October 2017



Relevant policy / legislation	Relevance to the assessment
	<p><i>authorities, as appropriate, on the assessment and proposed mitigation measures. The assessment should distinguish between the construction and operational project stages for the development comprised in the application."</i></p> <p>Paragraph 5.10 states: "<i>The applicant should also consult with Highways England, Network Rail and relevant highway and transport authorities, and transport operators, to understand the target completion dates of any third party or external schemes included in existing rail, road or other transport investment plans. It will need to assess the effects of the preferred scheme as influenced by such schemes and plans.</i>"</p> <p>Paragraph 5.12 specifies that for schemes and related surface access proposals or other works impacting on the strategic road network, the applicant should have regard to DfT Circular 02/2013, The Strategic Road Network and the delivery of sustainable development (or prevailing policy), and the National Networks NPS (see below)</p> <p>The revised draft ANPS contains specific obligation in respect of mitigation. In particular, paragraph 5.13 states: "<i>The surface access systems and proposed airport infrastructure may have the potential to result in severance in some locations. Where appropriate, the applicant should seek to deliver improvements or mitigation measures that reduce community severance and improve accessibility.</i>"</p>
<p>National Policy Statement for National Networks (NN NPS)³</p>	<p>This document sets out the Government's policies to deliver development of nationally significant infrastructure projects on the national road and rail networks. It also provides assessment principles and decision-making criteria.</p> <p>Paragraphs 4.7 and 4.8 of the revised draft ANPS explain how the NN NPS will be applied in conjunction with the revised draft ANPS.</p> <p>4.7 Where the applicant's proposals in relation to surface access meet the thresholds to qualify as nationally significant infrastructure projects under the Planning Act 2008, or is associated development under section 115 of the Planning Act 2008, the Secretary of State will consider those aspects by reference to both the National Networks NPS and the Airports NPS, as appropriate...</p> <p>4.8 The Secretary of State will consider any relevant nationally significant road and rail elements of the applicant's proposals in accordance with the National Networks NPS and with the Airports</p>

³ Department for Transport, National Policy Statement for National Networks, 2014



Relevant policy / legislation	Relevance to the assessment
	<p>NPS. If there is conflict between the Airports NPS and other NPSs, the conflict should be resolved in favour of the NPS that has been most recently designated. Paragraphs 5.203 to 5.205 cover the assessment of schemes and require assessments to have regards to local policies, to consult the relevant highway authority and local planning authority, as appropriate, on the assessment of transport effects and to consider reasonable opportunities to support other transport modes in developing infrastructure.</p> <p>Paragraph 5.206 states that the Environmental Statement should describe those effects and mitigating commitments for road and rail developments.</p> <p>For strategic rail freight interchange developments, WebTAG methodology (or any successor) should be used, again with the Environmental Statement describing any significant environmental effects arising from impacts upon the or changes to the transport network. Mitigation measures should be identified, and discussions held with network providers about the possibility of co-funding by government for third party benefits.</p> <p>Paragraph 5.209 specifically states “<i>For schemes impacting on the Strategic Road Network, applicants should have regard to DfT Circular 02/2013 The Strategic Road Network and the delivery of sustainable development (or prevailing policy) which sets out the way in which the highway authority for the Strategic Road Network, will engage with communities and the development industry to deliver sustainable development and, thus, economic growth, whilst safeguarding the primary function and purpose of the Strategic Road Network.</i>”</p>

17.2.3 Due regard will also be given to local policies and the Government’s 25 year environment plan⁴.

17.3 Stakeholder engagement

17.3.1 Stakeholder engagement has taken place in relation to the scope of the EIA traffic and transport chapter, and the development of both the SAS and the TA, with several stakeholders including Transport for London (TfL), the Department for Transport (DfT), Highways England (HE), Network Rail and the Heathrow Strategic Planning Group (HSPG).

⁴ HM Government. A Green Future: Our 25 Year Plan to Improve the Environment. 2018



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- 17.3.2 The aim of this transport engagement to date has been to identify the various elements required for an effective SAS that caters for both passengers and colleagues and benefits the wider area by meeting social and environmental policy goals and to discuss how the SAS can be tested and assessed within the highway modelling work and the TA.
- 17.3.3 The assessment of the environmental effects related to transport has also begun to be discussed with stakeholders, details of which can be found in Table 17.2. Other stakeholders will be engaged with for the traffic and transport EIA as the DCO Project progresses.

Table 17.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
<p>Highways England</p>	<p>Technical Working Groups (TWGs) were established in March 2018 to ensure ongoing collaborative communication between Heathrow and Highways England on key Expansion topics; namely:</p> <ol style="list-style-type: none"> 1. Environment 2. Road Design & Safety 3. Tunnels and Structures 4. Constructability 5. Traffic Modelling 6. TA <p>An introductory session was held in March 2018 in relation to the TA and the traffic and transport EIA which discussed the proposed approach to both assessments. The meeting introduced at a high level the scope of both assessments and their interfacing relationship. At this meeting it was agreed that the EIA chapter would be discussed in more detail at a later date.</p> <p>A meeting was held in April 2018 which focussed on the traffic and transport EIA chapter, including the scope of the assessment and proposed approach. There were no comments or queries in relation to how the traffic and transport chapter was being progressed.</p>	<p>The TWGs meet monthly, ensuring ongoing engagement as the DCO Project develops. The TWGs will jointly agree any items to be escalated to the Heathrow Highways Steering Group (HHSG) for approval.</p>
<p>HPSG – Transport Sub Group</p>	<p>A number of meetings have been held with local authorities, represented by the HSPG and its Transport Sub Group, in 2018; relating to</p>	<p>Regular engagement will continue to be undertaken with this group as the traffic and transport</p>

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Consultee	Engagement undertaken to date	Proposed future engagement
	<p>the SAS, traffic modelling, the TA and the EIA traffic and transport chapters.</p> <p>In January 2018 an introductory presentation on the SAS was given, ahead of Consultation 1. On the 8th February 2018 a more detailed presentation and discussion of Consultation 1 was provided, with a particular focus on traffic modelling. On the 11th April 2018 an introductory meeting was held with this group to discuss the scoping for the TA and the EIA traffic and transport chapter, as well as an update on traffic modelling. The scope of the traffic and transport chapter was introduced at a high level, as well as discussing its relationship alongside the TA.</p>	<p>assessment progresses. This will happen in parallel with ongoing discussions in relation to the wider transport work for the TA, modelling and SAS.</p>
Heathrow Area Transport Forum (HATF)	<p>Introductory sessions on the SAS, ahead of Consultation 1, were held in December 2017 with the HATF Steering Group, and with three of its four working groups: Bus and Coach, Commuting, and Rail. The Freight working group is not actively meeting. It was agreed at this meeting that updates on the SAS, and on wider Expansion issues, would be provided at each of the quarterly Steering Group meetings. On this basis, a second session was held on 6 March, with the SAS and the Consultation 1 documents presented in more detail.</p>	<p>Regular engagement will continue to be undertaken with HATF on the SAS and on wider Expansion issues, including the TA and modelling. HATF is an important stakeholder, particularly because the NPS outlines that the SAS must be prepared in conjunction with this group.</p> <p>The next meeting is scheduled for June 2018.</p>
TfL	<p>There were a number of meetings with TfL in 2017, predominantly focusing on traffic modelling and on the SAS, ahead of Consultation 1.</p> <p>A meeting was then held on 26th January 2018 to discuss Consultation 1, and specifically the SAS, in more detail.</p>	<p>Heathrow have proposed a monthly strategy meeting with TfL, and a number of surface access working groups; including traffic modelling and appraisal.</p> <p>These meetings have not been scheduled to date.</p>

17.4 Study areas

- 17.4.1 Two study areas will be used for assessing the effects of traffic and transport; one to assess effects upon highway users to include pedestrians and cyclists, and a second to assess effects upon public transport.



Highway study area

- 17.4.2 The study area for assessing effects upon the highway and its users presented in this section and shown in Figure 17.1, is based on a geographical area defined by initial highway modelling and is applicable to both the construction and operational assessment of the DCO Project. The Heathrow Highway Assignment Surface Access Model (HHASAM) will be used to determine links and junctions that require further assessment, based on considering their performance against certain thresholds of change.
- 17.4.3 HHASAM evaluates how the highway network accommodates the forecasted demand and will be used for this assessment to identify locations which would experience changes in traffic flows, giving predictions about journey delays and in turn information on pedestrian and cyclist delay and severance. The geographical area that HHASAM covers is split into two parts (as shown in Figure 17.1):
1. Area of Detailed Modelling (AoDM), that has been developed in line with WebTAG guidance⁵
 2. Rest of Fully Modelled Area (RoFMA).
- 17.4.4 Effects outside of these areas can be assessed if necessary but effects in this wider area would be of a reduced level of certainty.
- 17.4.5 The geographical extents of the AoDM and RoFMA which form the study area have been determined by including the highway links on which a third runway scenario (assuming 140mmpa) and 115,000 colleagues without additional demand management leads to a 5% increase in trips. This 5% threshold was chosen based on Institution of Highways and Transportation guidance⁶ that assumes significant impacts to highway capacity may occur if peak hour traffic flow increases by more than 5% where the network is sensitive. Where the network is not considered sensitive, this threshold increases to 10%. Adopting a conservative, precautionary approach, the lower figure is being used for the purposes of the assessment, which has resulted in a larger study area than if the 10% figure was used.
- 17.4.6 Beyond the boundaries of the AoDM and RoFMA, the increase in Heathrow related trips on the majority of links falls below 5% and are therefore not deemed necessary for inclusion in this assessment. Initially, this is how the study area was determined, however the focus of the EIA will be on locations within this study area which experience a greater change in traffic flow.
- 17.4.7 Uncertainty issues in relation to modelling will be addressed as part of the model development, model calibration and model validation process. Further information

⁵ Department for Transport TAG Unit M3.1 Highway Assignment Modelling, paragraph 2.2.5. <https://www.gov.uk/transport-analysis-guidance-webtag> (accessed 09 February 2018)

⁶ Institution of Highways and Transportation, Guidance for Traffic Impact Assessment, 1994



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in relation to the development of the modelling suite can be found in **Appendix 17.1: Surface access modelling**.

- 17.4.8 The assessment of transport effects upon the highway network within an EIA is based around where the modelling identifies changes in traffic flow volumes within the study area which exceed change in flow thresholds. The thresholds are explained in more detail in Section 17.9 but cover changes to flow greater than 30%, or alternatively for sensitive areas, locations where HGV flows exceed 10%. These locations will be subject to further assessment. Locations within the study area which are predicted to operate below the assessment thresholds will not be assessed further in terms of transport effects, although those locations may be the subject of assessments for other impacts such as air quality.

Public transport study area

- 17.4.9 Railplan⁷ is a separate TfL modelling tool covering London and the South East of England that evaluates how the public transport network will respond to forecasted demand. It models the likely route and service choices of users and predicts levels of crowding. This will be used for determining the study area for the assessment of public transport effects such as capacity and crowding, which informs the determination of public transport amenity effects. The extents of Railplan can be seen in Figure 17.2.
- 17.4.10 Services which are identified through the modelling to experience delay, capacity issues of crowding would be assessed further as part of the traffic and transport EIA, with appropriate thresholds for undertaking this assessment to be determined considering the expected level of effect and discussed with key stakeholders.
- 17.4.11 For public transport, assessment of services will occur where the modelling shows there are changes such as changes in provisions, capacity, crowding or delay which exceed acceptable levels. These levels are still to be determined once the extent of change can be reviewed to identify suitable thresholds for assessment. They would be discussed with key stakeholders before being applied. Assessment will also take place where there are changes to the physical transport infrastructure (such as new roads or diversions).
- 17.4.12 The extent of the study area is reliant upon modelling results to determine where change in flows, capacity or delay would occur, and the magnitude of the changes, to focus assessment upon these areas only.
- 17.4.13 As the design and consultation processes progress and the DCO Project is refined, the study areas may also continue to evolve to accommodate any

⁷ Transport for London Planning London's Strategic Transport Models <http://content.tfl.gov.uk/londons-strategic-transport-models.pdf> (accessed 04 May 2018)



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changes that are generated. If the study area changes, data collection will also be reviewed and updated.

17.5 Sources of data used in scoping

Baseline surveys

17.5.1 Baseline surveys were undertaken to inform HHASAM, which will provide information on changes in traffic flow to form the basis of the EIA for traffic and transport. Rail plan also contains baseline information on current public transport use. Baseline information on traffic flows and public transport utilisation to inform the traffic and transport EIA will come from these two models. More information on these baseline datasets is provided in this section.

Baseline datasets

17.5.2 Detailed baseline information is in the process of being collated from third party sources to inform this assessment, as well as to support the TA. This includes (but is not limited to):

1. Information on public bus routes including timetables, bus stop locations and routes, to be obtained from relevant service operators
2. STATS19 personal injury collision (PIC) data
3. Transport for London, London Collision Map⁸
4. Cycle Route Guides from Transport for London⁹
5. Sustrans National Cycle Network Map (for routes on the public highway only)¹⁰
6. Other walking and cycling route infrastructure within the study area to be determined through the baseline reports, supplemented through site walkovers.

17.5.3 Datasets will be analysed to understand baseline travel patterns by mode to inform this assessment and will be presented in a suite of baseline reports which will be used by both the traffic and transport EIA and the TA.

17.6 Baseline conditions

17.6.1 Headline baseline information is presented below by mode to provide a summary of the transport baseline which will be refined and more focussed in due course. This information currently focusses upon the key routes (highway and public

⁸ London collision map <https://tfl.gov.uk/corporate/safety-and-security/road-safety/london-collision> (accessed 04 May 2018)

⁹ Routes & maps <https://tfl.gov.uk/modes/cycling/routes-and-maps> (accessed 04 May 2018)

¹⁰ Search the National Cycle Network <https://www.sustrans.org.uk/ncn/map> (accessed 04 May 2018)



transport) to and from the airport, as these are the most likely routes which will experience changes in demand and therefore experience impacts and affect non-airport related trips as well as those trying to access the site.

Highways

- 17.6.2 Heathrow has direct access to the M25 and M4 and is close to the M1, M3 and M40 motorways which provide access to the rest of the UK. Important local road access is provided by the A4 and A30 routes which are operated by TfL. Heathrow owns and manages the roads within the airport boundary, which includes a full perimeter road providing access around the airport. The road layout surrounding Heathrow is shown in Figure 17.3.
- 17.6.3 Many of the roads around Heathrow are congested¹¹. More specifically, this includes key routes such as the M25, M4, A40, A30, as well as many of the minor roads surrounding the airport.

Rail

- 17.6.4 Fast and frequent rail services connect Heathrow to London. These include the London Underground Piccadilly line, Heathrow Connect and Heathrow Express. This three-pronged offering provides the following levels of service and journey times:
1. The Piccadilly Line on the London Underground provides six trains per hour in each direction between central London and all Heathrow terminals at peak times. The journey time is 55 minutes from Piccadilly Circus to Heathrow Terminal 5. On Monday to Thursday, services start at approximately 05:45 and finish at 00:25. On Friday and Saturday evenings, services continue throughout the night with six trains per hour
 2. Heathrow Connect provides a stopping service between Paddington and Heathrow Terminals 2, 3, and 5 via local intermediate stations. There are two trains per hour during the peak and journey time is approximately 40 minutes from Paddington to Heathrow Terminal 5. This service operates from approximately 04:45 to 23:45
 3. Heathrow Express provides a direct service between Paddington and Heathrow Terminals 2, 3, and 5. The journey time is the quickest of the three rail options at 15 minutes. Services run every 15 minutes and from 05:10 to 23:25.

¹¹ Heathrow, Our Approach to Developing a Surface Access Strategy, 2018
<https://www.heathrowconsultation.com/wp-content/uploads/2018/01/6747-Expansion-Surface-Access-v7-72dpi.pdf> (accessed 02 March 2018)



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Buses

- 17.6.5 Local bus services play an important role at Heathrow by providing a dense network of local transport links. There are 31 bus routes that currently serve Heathrow at a combined frequency of around 80 buses per hour¹¹. This includes 13 routes that provide early morning or 24-hour services, allowing employees who work shift-hours access to public transport options.¹²¹³¹⁴¹⁵
- 17.6.6 Heathrow's Free Travel Zone promotes the use of bus travel in and around the airport, helping to encourage the use of this sustainable mode of transport. TfL and a number of other operators manage bus routes around Heathrow, and these are planned in co-ordination with Heathrow.
- 17.6.7 Frequent coach services also connect Heathrow with rest of the UK 24-hours a day. The airport already operates as an important hub for National Express linking over 75 major towns and cities with Heathrow.

Walking and cycling

- 17.6.8 Walking and cycling are modes mainly used for colleague travel to, from and around the airport, as well as non-airport related local trips. Within the study area, there are footways and pedestrian crossings to support journeys by foot, as well as several signed cycle routes.

Parking drop off and pick up

- 17.6.9 Heathrow Airport Ltd controls around 39,000 on-airport car parking spaces, with approximately 23,500 spaces for passengers and 15,500 for colleagues. There are a further 12,500 spaces that are under the control of other tenants around the airport, including British Airways.
- 17.6.10 For passengers being dropped off at the airport there are free set-down lanes outside the terminals. There is no free pick up area adjacent to the terminals, most passengers being collected from a flight use the paid short stay car park or one of the longer stay car parks for free (if less than two hours).

¹² Buses from Heathrow Airport North <http://content.tfl.gov.uk/bus-route-maps/heathrowairportnorth-a4-0815.pdf> (accessed 04 May 2018)

¹³ Buses from Heathrow Terminals 2&3 <http://content.tfl.gov.uk/bus-route-maps/heathrow-t23-0117.pdf> (accessed 04 May 2018)

¹⁴ Buses from Heathrow Terminal 4 <http://content.tfl.gov.uk/bus-route-maps/heathrow-t4-0117.pdf> (accessed 04 May 2018)

¹⁵ Buses from Heathrow Terminal 5 <http://content.tfl.gov.uk/bus-route-maps/heathrow-t5-0117.pdf> (accessed 04 May 2018)



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17.7 Likely significant effects requiring assessment

17.7.1 Effects presented in Table 17.3 have the potential to be significant and require further assessment in the EIA.

Table 17.3 Likely significant traffic and transport effects

Activity	Effect	Receptor
Construction		
Movement of materials to and from site	Increase in HGV movements to and from the airport which could affect journey times, highway capacity and lead to severance or impact road safety.	Highway users (all modes)
Movement of construction workers to and from site and the variation in numbers required based on construction phasing	Increased patronage of public transport services affecting capacity and crowding. Movements on the highway network causing journey delay, congestion and severance.	Highway users (all modes) Public transport users
Changes to road layouts or temporary traffic interventions or management (such as single lane working)	Changes to road layout or functionality leading to journey delay, congestion and severance or impact road safety.	Highway users (all modes) Public transport users (not including rail)
Movement of hazardous material to and from site	Increase in HGV movements to and from the airport which could affect journey times, highway capacity and lead to severance or impact road safety.	Highway users (all modes)
Operation		
Movement of people (passengers, colleagues) to and from the Airport	Increased patronage of public transport services impacting upon capacity and crowding. Movements on the highway network causing journey delay, congestion and severance or impact road safety.	Highway users (all modes) Public transport users
Movement of people (passengers, colleagues) to and from the Airport by public transport	Schemes provided as part of the SAS may provide a benefit to increased mode choice, improved journey time or improved accessibility to public transport services.	Public transport users
Movement of freight to and from the Airport	Increase in freight movements to and from the airport which could affect journey times, highway capacity and lead to severance or impact road safety.	Highway users (all modes)



Activity	Effect	Receptor
Changes to bus service routes as a result of changes to road layouts.	Routes may become longer or more difficult to access	Public transport users

17.7.2 For the traffic and transport topic, receptors have been identified as other highway and public transport network users including:

1. Vehicle drivers and passengers
2. Bus passengers
3. Coach passengers
4. Rail passengers
5. Pedestrians and cyclists.

17.8 Effects not requiring assessment

17.8.1 At this stage of the DCO Project's development, no effects have been scoped out of the assessment.

17.9 Proposed approach to the assessment

17.9.1 The study areas for highways and public transport are set out in Section 17.4. These will be kept under review as the design and consultation processes progress, and the DCO Project is refined and related topic assessment study areas are confirmed. Therefore, the study areas may evolve as appropriate.

17.9.2 Whatever option, described for the components in **Chapter 3: The DCO Project**, is selected, the scope of the assessment and methodologies that will be used will not be affected.

Additional baseline information required

17.9.3 As described in Section 17.4, should the study areas change in response to the evolving design, the need for any additional baseline data for traffic and transport will be reviewed and updated.

17.9.4 The TA and traffic and transport EIA chapter will share a suite of baseline reports which will cover the following topics:

1. Highways – to include private vehicle flows, road freight flows and general highway characteristics and infrastructure provisions such as speed limits,



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carriageway widths and any restrictions such as for height or weight. This will be collected through a combination of desktop research and site observations and consider flow, delay and congestion

2. Public transport – public buses, rail, underground routes and service frequencies, to include information about their capacity and crowding. This will be collected through a combination of desktop research and site observations
3. Taxis – to include private hire and taxis. This will include provision of drop off and pick up facilities, and number of vehicles and their typical occupancies. This will be collected through a combination of desktop research and site observations
4. Non-motorised users – covering cycling and walking. This will include understanding where there are currently on-road cycle provisions and footways for pedestrians, including crossing points. This will be collected through a combination of desktop research and site observations.

17.9.5 These reports will contain a robust baseline where modelling suggests that specific locations would exceed assessment thresholds. This will enable assessment of the likely effect at each location against a baseline to determine the significance of the effect. A wide set of baseline data would be used to determine threshold exceedance and presented as part of the traffic and transport EIA baseline data for the screened area for further assessment only.

Assessment years

17.9.6 The overall approach to determining the assessment years that will be used for the EIA is provided in Section 4.3: Spatial and temporal scope. However, the assessment years presented in this section have been determined for the purposes of the traffic and transport EIA specifically.

17.9.7 The baseline year for the traffic and transport EIA is proposed to be 2016, which matches the base year of the modelling suite, although this assessment may draw upon information from other sources which are more up to date, for example the most recent public transport service schedules.

17.9.8 Information on the construction methodology and its potential effects was not available at the time of writing this Scoping Report to inform possible early years of assessment when construction will be taking place. The assessment year(s) for considering construction will be determined once more information is available on the construction strategy and phasing during this period. This would likely cover a peak stage of construction.

17.9.9 The assessment of operational years for both future baseline and assessment will be for the years 2030 and 2040, which aligns with requirements within the revised



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draft ANPS in relation to meeting and maintaining certain mode splits. The models are set up for assessing these two years, however, it is likely that assessment of other scenarios and years will also be required in order to set out a representative account of the DCO Project's operational and construction effects. These would include:

1. Early ATM uplift year anticipated to be around 2021 or 2022
2. Peak construction (which would be prior to year of opening of third runway)
3. Year of opening of third runway - 2026
4. Year of completion of construction - 2035

17.9.10 For each assessment, the assessment year would be considered without the DCO Project to provide a baseline (reference case) for each assessment year. This will help to determine the actual impact of the DCO Project.

17.9.11 Once the profile of demand is refined for both construction and operation, it may become necessary to assess other years. This requirement will be reviewed and discussed with stakeholders.

17.9.12 Between the assessment years, baseline conditions could change as follows:

1. Change in traffic flows on the highway network which could lead to journey delays, affect capacity, and for non-motorised users result in effects related to severance, fear and intimidation
2. Changes to the layout and provision of the public highway routes requiring journeys to be re-routed (including public bus service diversions)
3. Change in public transport provision or utilisation which could lead to changes in capacity and affect journey reliability, and lead to changed demand and infrastructure requirements to support this
4. Changes in parking provisions at Heathrow could cause changes to how passengers and colleagues choose to travel, having wider impacts upon surface access network.

Construction and operation assessment methodology

17.9.13 The approach set out in this section applies to both construction and operational phases, with no difference in assessment methodology for the two phases.

17.9.14 The Institute of Environmental Assessment (IEA) guidance¹⁶ is predominantly focussed on the effects around vehicular movements rather than taking a wider

¹⁶ Institute of Environmental Assessment. Guidelines for the Assessment of Road Traffic, 1993



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multi-modal view of potential effects. It suggests that the following criteria are assessed:

1. Severance
2. Driver delay
3. Pedestrian delay
4. Pedestrian amenity
5. Fear and intimidation
6. Accidents and safety
7. Hazardous loads.

17.9.15 For the purposes of this assessment, these have been combined into the following, including additional criteria from the Design Manual for Roads and Bridges (DMRB):

1. Highway network delay, considering how the impact of physical changes to the road network and or changes in traffic flow associated with the DCO Project will affect delay on the highway network for both private trips (all vehicle types) and public transport (buses)
2. Driver stress and view from the road – considering how the impact of physical changes to the road network will impact upon driver stress, and how this is impacted upon by the view from the road. This assessment will follow DMRB guidance¹⁷
3. Pedestrian and cyclist delay – considering how the impact of physical changes to the road network and or changes in traffic flow associated with the DCO Project will affect journey times for pedestrians and cyclists
4. Pedestrian and cyclist amenity – considering how the impact of physical changes to the road network and or changes in traffic flow associated with the DCO Project will affect the pleasantness of journeys made on foot and by cycle. This assessment will take into consideration fear and intimidation issues
5. Severance – considering how the DCO Project will affect community severance issues either through physical changes to the transport networks or through changes to traffic flow
6. Public transport amenity – considering how the impact of physical changes to the public transport network and or changes in public transport demand

¹⁷ Highways Agency, Design Manual for Roads and Bridges, Volume 11 Section 3 Part 9 Vehicle Travellers, 1993



associated with the DCO Project will affect the pleasantness of journeys made by public transport. This assessment will take into consideration service capacity/crowding issues and any delay or re-routing required

7. Accidents and safety.

Highway network delay

- 17.9.16 Change in journey times on the highway network will be assessed using information from the highway modelling which will provide an indication of how flows have changes on the network in the assessment years against the reference positions for each year. Changes in journey time will also reflect instances of severance where longer or less direct routes would have to be taken, resulting in longer journey times. This will include delays to all highway users, including public bus services.
- 17.9.17 Within the study area, the scope of the assessment regarding changes in flows will be limited to locations which exceed guidance thresholds set out in the Guidelines for the Environmental Assessment of Road Traffic, Guidance Note Number 1¹⁸ which states:
1. Highway links where total traffic flows will increase by a minimum of 30% or where the number of heavy goods vehicles will increase by a minimum of 30%
 2. Specific sensitive areas where total traffic flows have increased by 10%.
- 17.9.18 In the first instance, highway modelling results will be assessed against the lower 10% threshold. Locations which exceed 10% change will then be assessed to determine if they should be classified as a sensitive area.
- 17.9.19 Sensitive areas will be links or junctions adjacent to community facilities such as open space or parks, schools, medical facilities, local shops, community centres and religious buildings, or have adjacent residential properties. The classification of locations as sensitive will be discussed with stakeholders. Given the characteristics of the area surrounding the DCO Project, it is anticipated that most of the assessment will be focussed upon areas that are classified as sensitive.
- 17.9.20 For any locations which have been found to have a minimum of 10% change in traffic flows but that are not classified as sensitive, these will be re-assessed to see if they experience a minimum of 30% increase. Any locations that satisfy this threshold will be assessed. Those which have a less than 30% change will be considered to be not significant and therefore will not be considered further.

¹⁸ The Institute of Environmental Assessment, Guidelines for the Environmental Assessment of Road Traffic, Guidance Note Number 1, Para 3.15, 1993



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- 17.9.21 For locations which are physically affected by the DCO Project (for example the re-routing of the A4), the effect of this upon all highway users would be considered further in this assessment.

Driver Stress and view from the road

- 17.9.22 Guidance in DMRB¹⁷ would be applied in assessing driver stress and the view from the road, covering links or junctions that have experienced a physical change to their layout. This guidance presents a matrix to enable the assignment of a level of stress (low, medium, high) based on changes in flow and speeds on a link. For the purposes of this assessment, low, medium and high levels of stress will correspond with magnitudes of minor, moderate and major respectively.

Pedestrian and cyclist delay

- 17.9.23 Potential change in journey times as a result of an increase in traffic affecting the ability to cross the highway, and/or result in a change in route due to the DCO Project leading to an increase in journey distance or time.
- 17.9.24 Locations on the highway network which are identified as being subject to increases in traffic flow will be assessed in relation to how this increase could affect pedestrians and cyclists, causing journey delay. For example, if an increased flow means a delay for crossing the road, with a magnitude being assigned to this delay. The level of delay will be calculated using Figure 1 in DMRB on Pedestrians, Cyclist, Equestrian and Community Effects¹⁹.
- 17.9.25 Average journey speeds of 5km/hr for people on foot and 20km/hr for cyclists will be assumed, and any route diversions will be considered in terms of the time it will take to travel these using these speeds. This would be assessed using information on where there are currently (or expected to be) flows of pedestrians and cyclists and considering how these may be affected by increases in traffic flow. Again, guidance in DMRB would be used to inform this assessment²⁰.

Pedestrian and cyclist amenity

- 17.9.26 A qualitative approach will be employed which will give an overall indication of the change in amenity and the number of journeys affected, and the bearing this may have upon fear and intimidation. This would be assessed based on professional judgement and guidance contained in DMRB²⁰ and will consider how the

¹⁹ Highways Agency, Design Manual for Roads and Bridges, Volume 11 Section 3 Part 8 Figure 1 Pedestrians, Cyclists, Equestrians and Community Effects, 1993

²⁰ Highways Agency, Design Manual for Roads and Bridges, Volume 11 Section 3 Part 8 Pedestrians, Cyclists, Equestrians and Community Effects, 1993



composition and volume of traffic has changed, with greater changes or higher HGV movements being assigned a greater level of magnitude.

Public transport amenity

- 17.9.27 This will be based upon information from Railplan as well as the SAS with regards to expected capacity of services and applying professional judgement as to how utilisation of this capacity could affect journey amenity, including issues related to crowding. Thresholds for magnitude will be set for levels of crowding, which will be based on how this will change from the reference case.

Accidents and safety

- 17.9.28 For those routes exceeding the stated thresholds, the potential change in PIC rates (measured in number of incidents per trip) will be calculated based on how traffic volumes will change for different road types and considering current PIC rates statistics for these locations using STATS19 data. The implications for human health impacts are also being considered.
- 17.9.29 Where a change in character of a road is expected, the likely impact of this change will be considered using professional judgement in conjunction with existing PIC data, taking into account any circumstances of factors which may elevate or lessen risks of accidents.

Magnitude, Sensitivity and Significance

Magnitude

- 17.9.30 The methodology for determining the magnitude of change to the baseline will be undertaken in line with guidance set out in the DMRB²¹ and by applying professional judgement due to the qualitative nature of some parts of this assessment. The same approach will apply to the construction and operation phases, considering the location of the effect, how long it will last for and considering if it is permanent or temporary.
- 17.9.31 The following quantitative and qualitative criteria are proposed for determining the magnitude of effect, considering positive and negative effects:
1. Major Magnitude – Very substantial change (positive or negative) to infrastructure or service provisions and/or severe departure from baseline conditions. Large scale or major improvement proposed

²¹ Highways Agency, Design Manual for Roads and Bridges, Volume 11 Section 2 Part 5 (HA 205/08) Assessment and management of Environmental Effects, 2008



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2. Moderate Magnitude – Notable change (positive or negative) to infrastructure or service provisions, but not negatively affecting the integrity. Some departure from baseline conditions
3. Minor Magnitude – Minor change (positive or negative) or improvement to infrastructure or service provisions but does not cause great change from baseline conditions
4. Negligible Magnitude – Very small change (positive or negative) to baseline conditions which may not be noticeable in the instance of most trips
5. No Change – No loss, gain or alteration to baseline conditions.

Sensitivity

17.9.32 Receptors for this assessment will include the following:

1. Vehicle drivers and passengers
2. Bus passengers
3. Coach passengers
4. Rail passengers
5. Pedestrians and cyclists.

17.9.33 Each receptor will be assigned a sensitivity value for the assessment.

17.9.34 The environmental value (sensitivity) of a receptor will be based on the following:

1. Very High – Very high importance, limited to no ability to absorb change
2. High – High importance and the receptor has some ability to absorb change
3. Medium – Medium importance and able to adapt somewhat to change
4. Low (or Lower) – Low importance and able to adapt to change, being tolerant of change
5. Negligible – Very low importance and is resistant to change.

Significance

17.9.35 The significance of effects will be calculated based on the combination of the magnitude and the sensitivity using the matrix in Table 17.4, taken from the DMRB²².

²² Highways Agency, Design Manual for Roads and Bridges, Volume 11 Section 2 Part 5 Assessment and management of environmental effects, Table 2.4, August 2008

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- 17.9.36 Significance ratings of Moderate or above will be considered as ‘significant’ with those noted as Neutral or Slight being ‘not significant’. This is summarised in Table 17.5.
- 17.9.37 It should be noted that the approach to assigning significance will be based upon reasoned argument, professional judgement of qualified transport planners, assessment of the extent of the traffic flow changes and consulting with appropriate stakeholders.

Table 17.4 Arriving at the significance of effect categories, taken from the DMRB

		Magnitude of Effect				
		No change	Negligible	Minor	Moderate	Major
Environmental Value (Sensitivity)	Very High	Neutral	Slight	Moderate or Large	Large or Very Large	Very Large
	High	Neutral	Slight	Slight or Moderate	Moderate or Large	Large or Very Large
	Medium	Neutral	Neutral or Slight	Slight	Moderate	Moderate or Large
	Low	Neutral	Neutral or Slight	Neutral or Slight	Slight	Slight or Moderate
	Negligible	Neutral	Neutral	Neutral or Slight	Neutral or Slight	Slight

Table 17.5 Determination of significant effects for traffic and transport

		Magnitude of Effect				
		No change	Negligible	Minor	Moderate	Major
Environmental Value (Sensitivity)	Very High	Not significant	Not 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	Not significant	Significant
	Negligible	Not significant	Not significant	Not significant	Not significant	Not significant



17.10 Approach to mitigation

Mitigation during construction

- 17.10.1 As part of the management of construction impacts, there will be careful consideration given to how materials and workers are transported to site, and minimising movements by road as much as possible. Mitigation will be embedded into the construction methodology, for example using rail for the movement of some materials, encouraging construction workers to use public transport, and minimising the amount of waste material to be removed from site.
- 17.10.2 A draft Code of Construction Practice (CoCP) will be produced, setting out a series of proposed measures and standards of work that would be applied throughout the construction period to provide effective planning, management and control during construction, to mitigate potential impacts upon people, businesses and the surrounding environment.
- 17.10.3 The draft CoCP will set out measures for the effective management of potential construction effects and will also outline the envisaged logistics measures, based on best practice construction methodologies, site management and effective vehicle and workforce management, supported by the delivery of temporary infrastructure (for example rail facilities or car parking) and systems (such as delivery management and security) both on and off site.
- 17.10.4 Construction freight movements on the highway will be subject to careful management, with deliveries being timed to avoid peak periods of congestion, and to use routes which have been designated as suitable for HGV movements. Further mitigation to address potential effects from this could include for example ensuring there are safe crossing points for pedestrians and having suitable traffic management in place where parts of the highway are directly affected by the DCO Project.
- 17.10.5 By encouraging construction workers to travel to the site by public transport, capacity and crowding on public transport services may be identified as an effect, which would be mitigated through the provision of additional services to support construction workers movement, or timing of shifts to avoid peak public transport times.

Mitigation during operation

- 17.10.6 The SAS will set out proposed initiatives for managing surface access movements and addressing the significant negative effects upon the highway or public transport network. This will include a forward monitoring plan for assessing how the baseline changes as the strategy is implemented. It is proposed that the SAS will be submitted with the DCO application and will be monitored and updated as



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required to manage changes to the surface access network in line with the requirements of the revised draft ANPS. Other mitigation will also be provided separate to the SAS which is discussed later in this section.

- 17.10.7 The SAS will be required to meet targets set out in the revised draft ANPS on public transport mode share (at least 50% of surface access passengers arriving or departing from Heathrow by public transport in 2030 and at least 55% of surface access passengers arriving or departing from Heathrow by public transport in 2040), colleague car use reduction (25% reduction of all colleague car trips by 2030 compared with 2013 levels and 50% reduction of all colleague car trips by 2040 compared with 2013 levels) and the commitment to no increase in Heathrow-related traffic.
- 17.10.8 A set of priorities have been developed to guide the development of the SAS. These seek to ensure that the effects of expansion on the transport network and local communities are adequately mitigated whilst delivering wider benefits to the local area and the UK as a whole. The SAS will contain specific and measurable targets that can be monitored over time. Eight key initiatives that will drive the development of the surface access strategy and deliver the surface access priorities have been identified. These initiatives are grouped into two areas:
1. Initiatives that improve the physical infrastructure and the level of service provided to passengers, colleagues and local residents
 2. Initiatives that make public transport easier to use and change travel behaviour more widely.
- 17.10.9 The proposed initiatives deliberately overlap and will inform the development surface access strategy for the airport. The eight key initiatives are:
1. Putting Heathrow at the heart of the rail network
 2. Creating a public transport focused airport
 3. Providing a resilient and reliable road network
 4. Investing in local transport solutions
 5. Strengthening the coach hub at Heathrow
 6. Making public transport easier to use
 7. Enabling more efficient and responsible use of the road
 8. Building on the success of our Commuter Programme.
- 17.10.10 The SAS is being developed in parallel to the TA and EIA, and will be informed through an interactive process, to ensure the results of any assessments are fed back to shape its development prior to the DCO application.



- 17.10.11 There are also a number of mitigation measures or proposed initiatives which are expected to become embedded within the design of the DCO Project or within the SAS. These will include as examples:
1. Encouraging and supporting colleagues to reduce reliance upon the private car for travelling to work at Heathrow through the introduction of new measures to support greater use of public transport services, walking and cycling
 2. Encouraging passengers to travel to Heathrow using public transport through the introduction of new measures to support greater use of public transport services
 3. Adherence of HGVs to designated routes – These routes will be discussed and agreed with the relevant highway authorities and take into consideration existing flows and the physical suitability of routes
 4. Use of holding areas and vehicle call off areas – A commitment to using holding and call off areas allowing vehicles to wait at suitable locations where they can be called to site when appropriate and at short notice, which can help to reduce circulating movements and congestion
 5. Use of consolidation centres – The provision of an off-airport consolidation centre could reduce the number of individual vehicle movements to the local warehouses and could therefore cut the number of road miles, and reduce the number of trips, reducing congestion
 6. Freight by rail – Facilities used for the construction phase could be used in the operational phase for rail freight, thereby reducing the number of freight vehicles on the roads associated with Heathrow.
- 17.10.12 As the SAS is an important element of the DCO Project, its role is to seek to minimise effects of movements to and from the airport through embedding mitigation within design and having a robust supporting strategy in place for managing movements. Through implementation of the SAS, it is expected that most effects which would have been designated as significant within the traffic and transport chapter will be able to be mitigated through the project design to reduce impacts upon the wider surface access network.
- 17.10.13 Other mitigation in addition to that which is embedded in the design or in the SAS would be identified and proposed as necessary to address any significant effects noted, for example upgrades to local highway junctions to improve capacity, safety or reduce driver stress, or changes to pedestrian or cycling facilities to address safety, delay or increases in journey times. Additionally, the revised draft ANPS includes reference to the upgrading or enhancing of road, rail or other transport networks or services which are physically needed to be completed to enable the DCO Project, which would also be considered.

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- 17.10.14 These would be in addition to mitigation noted in the SAS and be a direct result of the EIA and TA and Heathrow would be committed to securing the necessary mitigation to address the impacts of the DCO Project.



Chapter 18

Water environment



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18. WATER ENVIRONMENT

18.1 Introduction

- 18.1.1 This chapter describes the scope of the assessment as it relates to the water environment. This chapter should be read in conjunction with the description of the development presented in **Chapter 3: The DCO Project**.
- 18.1.2 This chapter describes:
1. The water environment policy and legislative context
 2. Topic-specific stakeholder engagement so far and future proposed engagement
 3. The study area for the assessment
 4. Sources of data used for scoping
 5. Baseline conditions, including current desk studies and surveys
 6. Likely significant effects of the DCO Project on the water environment
 7. Effects not requiring assessment
 8. Proposed approach to the assessment
 9. Approach to mitigation.
- 18.1.3 The scope of this water environment assessment encompasses effects on all surface¹ and groundwater² features from all activities associated with the DCO Project, including effects on both water quality and water quantity (e.g. changes to flow or groundwater level). The proposed scope of the assessment on these features from the mobilisation of potential contaminants already present on the site can be found in **Chapter 14: Land quality**. The proposed scope of the assessment with respect to water dependent ecological features can be found in **Chapter 6: Biodiversity**. The scope of the water environment assessment has overlaps with **Chapter 8: Climate change**, in terms of the impact of future climate on the water environment. Major accidents or disasters either relating to the water environment, or that could have an effect on the water environment, are considered in **Chapter 15: Major accidents and disasters**.

¹ Surface water features are defined as rivers, ditches, lakes, reservoirs, canals and dependent abstractions, discharges and designated sites.

² Groundwater features are defined as underground bodies of water and dependent abstractions, discharges and designated sites.



18.2 Policy and legislative context

- 18.2.1 This section identifies the relevant policy and legislation that has informed the scope for the assessment presented in **Chapter 18: Water environment**. Further information on policies relevant to the EIA and their status is set out in Section 1.9: Policy, which should be read in conjunction with this chapter.
- 18.2.2 The key national policies and legislation relevant to the assessment of the water environment for the DCO Project are summarised in Table 18.1.

Table 18.1 Policy and legislation relevant to the water environment

Relevant policy/legislation	Relevance to the assessment
Policy	
Revised draft Airports National Policy Statement (revised draft ANPS)³	<p>Sets out requirements for the Project for the management of Flood risk and Water quality and resources. It sets out the expectations for the scope of assessment, requiring compliance with:</p> <ol style="list-style-type: none"> 1. NPPF 2. UK Climate Change Risk Assessment 3. Flood and Water Management Act 2010 4. The Water Framework Directive and its daughter directives (Priority Substances and Groundwater) <p>Specifically, it specifies that in preparing a Flood Risk Assessment the applicant should:</p> <ol style="list-style-type: none"> 1. Consider the risk of all forms of flooding arising from the development, in addition to the risk of flooding to the project, and demonstrate how those risks will be managed and, where relevant, mitigated, so that the development remains safe throughout its lifetime 2. Take into account the impacts of climate change 3. Consider safe access and exit arrangements 4. Include the assessment of residual risk after risk reduction measures have been taken in to account, and demonstrate that this is acceptable for the development 5. Consider if there is a need to remain operational during a worst case flood event over the scheme’s lifetime 6. Provide evidence for the Secretary of State to apply the Sequential Test and Exception Test, as appropriate. <p>In relation to water quality and resources, it specifies that the assessment should describe:</p> <ol style="list-style-type: none"> 1. The existing quality of water affected by the Project 2. Existing water resources affected by the Project and the impacts of the Project on water resources

³ Department for Transport, Revised draft Airports National Policy Statement, October 2017



Relevant policy/legislation	Relevance to the assessment
	<p>3. Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the project, and any impact of physical modifications to these characteristics</p> <p>4. Any impacts of the project on water bodies or protected areas under the Water Framework Directive and source protection zones around potable groundwater abstractions</p> <p>5. Any cumulative effects.</p> <p>It also specifies that the applicant should assess the effects on the surrounding water and wastewater treatment network in cooperation with the relevant water and sewerage undertaker(s), and address any future water infrastructure needed for the scheme, including for supplied and sewerage treatment, and the effects on the surrounding water and wastewater treatment network.</p>
<p>National Networks National Policy Statement⁴</p>	<p>Sets out requirements for relevant elements of the project with respect to Flood risk and Water quality and resources. The expectations and requirements are comparable to those of the revised draft ANPS, with no additional assessment requirements compared to the revised draft ANPS.</p>
<p>National Planning Policy Framework (NPPF)⁵ (2012)</p>	<p>Sets out planning policy for England and places a general presumption in favour of sustainable development. Steers development towards areas at lowest risk of flooding, and requires that flood risk should not be increased elsewhere as a result of development.</p> <p>A draft revised NPPF⁶ is currently being consulted upon, and any revisions relevant to the scope of this impact assessment will be given due regard.</p>
<p>Legislation</p>	
<p>The EU Water Framework Directive (2000/60/EC) (WFD), as enacted into domestic law by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017</p>	<p>The EU Water Framework Directive (WFD) (2000/60/EC), is enacted into domestic law by the Water Environment (WFD) (England and Wales) Regulations 2017 ('The 2017 Regulations'). The WFD sets a default objective for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve Good status (comprised of scores for Ecological Status and Chemical Status). Although the WFD states that Good status should be achieved by 2015 the 2017 Regulations stipulate that Good status should be achieved by 2021 or, in relation to water quality in respect of some priority substances, 2027. Where it is not possible to achieve Good status by 2027, alternative water body objectives can be set. The current (baseline) status, and the measures required to achieve the 2027 status objective are set out, for each water body, in the relevant River Basin Management Plans (RBMPs), as prepared by EA every six years.</p>

⁴ Department for Transport, National Policy Statement for National Networks, 2014

⁵ Department for Communities & Local Government, National Planning Policy Framework, 2012

⁶ Ministry of Housing, Communities & Local Government, National Planning Policy Framework Draft Text for Consultation, 2018



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Relevant policy/legislation	Relevance to the assessment
	Under the WFD, River Basin Management Plans (RBMPs) assess the overall ecological health of the water environment and identify measures for improvement. The assessment takes account of water quality, channel hydromorphology, aquatic ecology, condition of supported water dependent designated sites and water availability. The RBMPs were first issued in 2009 and updated during 2015. Further updates are due in 2021 and 2027. The relevant RBMP for the Project is the Thames RBMP.
Flood and Water Management Act 2010	The Flood and Water Management Act was published in 2010. It sets out the Government's proposals to improve flood risk management, water quality and ensure water supplies are more secure. In December 2009, the Flood Risk Regulations were published, which transpose the EU Floods Directive (The European Union (EU) Floods Directive (2007/60/EC), as enacted into domestic law by the Flood Risk Regulations 2009) into UK law and these also cover the flood issues from the Flood and Water Management Act.
Environment Act 1995	The Environment Act 1995 established the Environment Agency and gave it responsibility for environmental protection and flood defence.
Land Drainage Act 1991	The Land Drainage Act 1991 & 1994 places responsibility for maintaining flows in watercourses on landowners. The Acts give the Local Authorities powers to serve a notice on landowners to ensure works are carried out to maintain flow of watercourses.
Water Resources Act 1991 Water Act 2003 The Environmental Permitting (England and Wales) Regulations 2016	The Water Resources Act 1991 states that it is an offence to cause or knowingly permit polluting, noxious, poisonous or any solid waste matter to enter controlled waters. The Act was revised by the Water Act 2003, which sets out regulatory controls for water abstraction, water impoundment and protection of water resources. Important for the proposed development is the requirement to obtain a licence for dewatering of engineering works and to ensure that any impact on the environment can be mitigated. Provisions for the regulation of water discharges to controlled waters are set out in the Environmental Permitting (England and Wales) Regulations 2016, these have replaced provisions in the earlier Acts.
Environmental Protection Act 1990	The Environmental Protection Act 1990 makes provision for the improved control of pollution arising from certain industrial and other processes; to re-enact the provisions of the Control of Pollution Act 1974 relating to waste on land with modifications as respects the functions of the regulatory and other authorities concerned in the collection and disposal of waste and to make further provision in relation to such waste.
Control of Pollution Act 1974.	An Act to make further provision with respect to waste disposal, water pollution, noise, atmospheric pollution and public health.



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- 18.2.3 Due regard will also be given to local policies and the Government's 25 year environment plan⁷, where they are relevant.

18.3 Stakeholder engagement

- 18.3.1 Stakeholder engagement on the water environment started in May 2017. Since that time there have been a large number of stakeholder conversations covering assessment approach, design and permitting strategy. The process of stakeholder engagement is ongoing, and is intended to ensure that stakeholders are engaged throughout. As part of this approach, the assessment methods described in the appendices to this chapter have been discussed with relevant stakeholders prior to their being issued for the purposes of scoping. This is intended to make the formal scoping process more straightforward, as much of the information will already have been seen (in some form) by those who will be consulted. The meetings that have taken place to date are summarised in Table 18.2.

Table 18.2 Engagement with stakeholders

Consultee	Engagement undertaken to date	Proposed future engagement
Environment Agency	<p>Consultation meetings covering the following issues:</p> <ol style="list-style-type: none"> Four meetings to discuss the approach to WFD assessment. The outcome of these discussions is the document in Appendix 18.1: Water Framework Directive method statement. This is being submitted to the Environment Agency for further review Two meetings to discuss the approach to Groundwater Modelling. The document in Appendix 18.2: Groundwater modelling method statement has been reviewed and updated following comment One meeting to discuss the approach to surface water quality assessment. The outcome of these discussions is the document in Appendix 18.3 Surface water quality assessment method this is being submitted to the Environment Agency for further review One meeting to discuss the approach to the Flood Risk Assessment. The document in Appendix 18.4: Flood Risk Assessment method statement has been reviewed and updated following comment. 	<p>Further regular meetings to discuss the approach to the assessment documents in Appendices 18.1 and 18.3 and the outcome of the assessments and approach to mitigation. Discussion will also cover any DMRB requirements.</p>

⁷ HM Government, A Green Future: Our 25 Year Plan to Improve the Environment. 2018



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Consultee	Engagement undertaken to date	Proposed future engagement
	5. One meeting to discuss some of the key permitting questions for the DCO Project.	
Natural England	<p>Consultation meetings covering the following issues:</p> <ol style="list-style-type: none"> Two meetings to discuss the approach to WFD assessment (joint with the Environment Agency). The outcome of these discussions is the document in Appendix 18.1 This is being submitted to Natural England for further review One meeting to discuss the approach to Groundwater Modelling (joint with the Environment Agency). The document in Appendix 18.2 has been reviewed and updated following comment. 	Further regular meetings to discuss the approach to the assessment document in Appendix 18.1 and the outcome of the assessments and approach to mitigation.
Colne Valley Regional Park CIC	Two meetings to discuss approach to river diversions and the technical detail behind the Consultation 1 materials.	Further meetings to discuss the approach to mitigation
Twin Rivers Management Board⁸	Two meetings to discuss the approach to the diversion of the Twin Rivers, Consultation 1 materials and the mitigation strategy.	<p>Further quarterly meetings to discuss design details and mitigation strategies.</p> <p>Ad-hoc meetings with individual members on specific elements of design/mitigation.</p>
Heathrow Strategic Planning Group (HSPG)	HSPG members include local authorities and other organisations ⁹ . One meeting has been held, to discuss approach to rivers diversions, flood storage and surface water drainage	Further meetings to discuss design approaches and to engage with the relevant local authorities in their role as Lead Local Flood Authorities.
Highways England	One meeting to brief on the emerging design options and the approach to scoping.	Discuss the approach to assessment and mitigation, including relevant methodology guidance documents and their application.
Affinity Water	Meetings to discuss water supply to the site.	<p>Further consultation on site water use.</p> <p>Consultation on any potential impacts on Affinity Water assets.</p>

⁸ The Twin Rivers Management Board Comprises: Environment Agency, HAL, Colne Valley Regional Park CIC, Royal Parks, EHM Ltd, Friends of the River Crane Environment (FORCE), Crane Valley Partnership (CVP), Green Corridor, Colne-CAN.

⁹ The membership of the HSPG is set out in Section 4.9: Engagement



Consultee	Engagement undertaken to date	Proposed future engagement
Thames Water	Meetings to discuss the foul drainage from the site.	Further consultation on site water discharge. Consultation on any potential impacts on Thames Water assets.

18.4 Study areas

- 18.4.1 The section sets out the proposed study areas for the water environment. As the design and consultation processes progress and the DCO Project is refined, the study areas will also continue to evolve to accommodate any changes that are generated. As the study areas change data collection will also be reviewed and updated.
- 18.4.2 The study areas for the water environment has been defined by the relevant surface and ground water body extents defined in the Thames River Basin Management Plan (RBMP)¹⁰. The definitions of the study areas used can be found in Table 18.3 and are illustrated in Figure 18.1. For the surface water environment, a differentiation has been made between the **local** study area and **wider** study area. The former is focused around the immediate extent of the DCO Project, where more detailed site monitoring data will be collected. The **wider** study area will be important for understanding more dispersed effects, as well as potential mitigation sites, and will have more limited, targeted monitoring associated with areas of development (understood as the DCO Project evolves) and mitigation.

Table 18.3 Definition of proposed study areas

Study area	Definitions
Surface Water	Local Surface Water Study Area: The catchments of the WFD surface water bodies within the Colne and Crane operational catchments (as defined in the Thames RBMP) that are intersected by elements of the DCO Project. This will be referred to as the LSA in this report. Wider Surface Water Study Area: Incorporates the wider catchment extent of the Colne and Crane operational catchments beyond the local study area, incorporating the Colne and Crane catchments from their source to the Thames. It also includes the catchments of the River Thames WFD water bodies into which the Colne and Crane discharge, and in which the borrow pits

¹⁰ Environment Agency, Thames river basin district: River basin management plan, Updated 2015



Study area	Definitions
	adjacent to the Thames sit ¹¹ (refer to Figure 18.3). This will be referred to as the WSA in this report.
Groundwater	The full lateral extent of the Lower Thames Gravels WFD groundwater body. This will be referred to as the GWSA in this report.

18.5 Sources of data used for scoping

Baseline data collection

18.5.1 Baseline data collection is ongoing. The baseline conditions presented in Section 18.6: Baseline conditions represent a review of the currently available data from the study areas.

Desk study

18.5.2 The baseline information presented to support this Scoping Report is largely based on a collation of desk based information, supported by some initial walkover observations. Data used and referred to in this report are summarised in Table 18.4. Information has also been drawn from literature, which is referenced in the chapter where relevant.

Table 18.4 Water environment data sources

Source	Data type
gov.uk open data	Shapefiles of rivers and all WFD water bodies Source Protection Zones Statutory and non-statutory designated nature conservation sites Consented discharges Flood Zones 2 and 3, flood defences and flood storage areas Surface water flood risk mapping LiDAR topographic data
Environment Agency	Licensed abstractions and consented discharges Groundwater level and quality data Groundwater vulnerability mapping Water quality monitoring locations and data Landfill locations and types WFD catchment plans River flows and levels at gauged locations

¹¹The River Thames extent of the WSA includes both freshwater and tidal stretches (refer to Figure 18.3). The downstream extent is defined by the Thames Upper Transitional (tidal) water body into which the Crane discharges. The freshwater stretch is defined by the River Thames Cookham to Egham and Egham to Teddington waterbodies, which receive drainage from the DCO Project



Source	Data type
	Hydraulic models: Lower Colne; Colne upstream of Denham; Crane
Environment Agency catchment data explorer	River Basin Management Plan water body classification data
Ordnance Survey	1:50,000 and 1:25,000 mapping 50m topography grid (OS Terrain 50) Mastermap (properties & infrastructure and rivers network layers)
British Geological Survey	Borehole record scans from on-line Geo-Index 1:50,000 digital geology
MAGIC website	Designated sites Soilscape Aquifer designations
National River Flow Archive	Daily average river flow data at gauging stations

- 18.5.3 Data requests have been submitted to the Environment Agency and Local Authorities for further baseline data such as private water supply information, up to date information on licensed abstractions and discharges and other hydrological and hydrogeological data. Further data requests will also be made to the Lead Local Flood Authorities (LLFAs) and Thames Water for sewer flooding information.

Baseline surveys

- 18.5.4 No baseline field surveys have been completed to an extent that allows the data to be used in this scoping assessment. However, the desk study data that are available, i.e. those datasets set out above, are adequate to inform the scoping assessment for the water environment.

18.6 Baseline conditions

Overview of the study area

- 18.6.1 The DCO Project is located in the lower reaches of the River Thames catchment within the direct catchments of a number of tributaries of the Thames, notably the Rivers Colne and Crane as well as a number of smaller watercourses (as shown in Figure 18.2 and Figure 18.3). The LSA is predominantly a low-lying area with a large urban and suburban extent. Moving out to the north of the WSA, the wider Colne catchment extends north into the Chiltern Hills and includes a number of chalk streams in its headwaters, while in the south of the WSA the River Thames flows into its tidal reaches at Teddington in London.



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- 18.6.2 Within the LSA, the land use is largely urbanised, but also contains large areas of open space including reservoirs, current and former gravel workings, Staines Moor, and areas of rough grassland and scrub. The land use surrounding Heathrow is described in more detail in earlier chapters including **Chapter 2: Description of existing site and its surroundings**, **Chapter 6: Biodiversity**, **Chapter 13: Landscape and visual amenity** and **Chapter 14: Land quality**.
- 18.6.3 There is a topographic gradient from north to south, with all watercourses ultimately draining to the Thames. The rivers are shown in Figure 18.2 and Figure 18.3 and are described in more detail in the next section.
- 18.6.4 The geology of the GWSA comprises the Chalk at depth beneath the clay, silt and sands of the Lambeth Group, which are overlain by the London Clay. The younger superficial sediments that overly the London Clay are dominated by Pleistocene river gravels. Patchy younger deposits also occur comprising alluvium along river channels (clay, silt, sand and gravel), head, peat and made ground. Historically, the river gravels have been heavily exploited within the GWSA, with many current and former extraction locations in the LSA. The former extraction areas are either now bodies of open water or landfills. The geology of the GWSA is illustrated in Figure 18.4 and Figure 18.5, and described in more detail in **Chapter 14: Land quality**.

Surface water features

- 18.6.5 The WSA includes a number of tributaries of the Thames, across the River Colne and River Crane catchments, as well as the lower reaches of the Thames itself (as shown in Figure 18.1 and Figure 18.2). In the LSA, from west to east the main channels comprise: Horton Brook; Colne Brook; Poyle Channel; Bigley Ditch; Wraysbury River; River Colne; River Ash, Portlane Brook, Longford River; The Duke of Northumberland's River and the River Crane. These are described in more detail in paragraphs 18.6.6 to 18.6.14. There are also numerous other smaller channels, which are tributaries of the more significant channels named here and are illustrated on Figure 18.3.
- 18.6.6 Horton Brook is a tributary of the Colne Brook. It flows from north to south and approximately parallel to the Colne Brook, and converges with the Colne Brook approximately 400m before its confluence with the Thames in Staines.
- 18.6.7 The Colne Brook originates from a bifurcation of the River Colne to the west of Uxbridge, approximately 5.5km upstream of the M4. It passes under the M25 to the immediate north of the M4/M25 interchange, then under the M4 to the immediate west of the M4/M25 interchange, then flows to the west of Poyle and Wraysbury Reservoir before discharging to the Thames in Egham.



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- 18.6.8 Bigley Ditch flows from the River Colne upstream of the M4, passes beneath the M4 at its junction with the M25, and flows adjacent to the M25 until it joins the Wraysbury River towards the southern end of Harmondsworth Moor.
- 18.6.9 Wraysbury River originates from a bifurcation of the River Colne upstream of the M4. It flows south through Harmondsworth Moor, then following for a distance along the east side of the M25 before, at Poyle, it flows under the M25. At that point it splits, with the Poyle channel taking a portion of flow westwards to the Colne Brook. The remaining flow in the Wraysbury River continues south to a point half way along the eastern edge of the Wraysbury Reservoir. North of Staines Moor Site of Special Scientific Interest (SSSI), the Wraysbury River flows back under the M25 and continues to the south, to converge with the Colne 150m upstream of the confluence with the Thames. Flow along the lower reaches of the Wraysbury River is managed by a series of flow control structures operated by the Environment Agency.
- 18.6.10 The River Colne rises in a series of Chalk fed rivers and flows south through the Colne Valley Regional Park, Uxbridge and on to the west of Heathrow, ultimately to converge with the Thames at Staines. The river has a number of bifurcations in the vicinity of the DCO Project, including to the Wraysbury River, Duke of Northumberland's River and the Longford River (as described in paragraphs 18.6.9 and 18.6.13).
- 18.6.11 The River Ash originates from a bifurcation of the River Colne to the south of the King George VI reservoir, from where it flows southeast. It converges with Stanwell Brook (which originates close to the southern boundary of Heathrow and flows southwards to the east of Staines Reservoirs) in Ashford, from where it takes a winding south-easterly route to the Thames to the west of Sunbury.
- 18.6.12 Portlane Brook and its western tributary Felthamhill Brook originate in Feltham, to the south of Heathrow, and drain approximately south-eastwards to the Thames to the east of Sunbury.
- 18.6.13 The Duke of Northumberland's River and Longford River originate from a bifurcation of the Colne approximately 200m downstream of the M4 in Harmondsworth Moor. They are historic¹² artificial diversion channels that, in their present state, comprise concrete cross sections. The purpose of the Duke of Northumberland's River is to convey water into the River Crane and then eastwards towards Syon Park and the River Thames at Isleworth. The Longford River conveys water around the existing Airport then southeast through Bushy Park, Hampton Court and discharges into the River Thames. It is the source of water for the Hampton Court fountains. Both rivers were diverted around the

¹² The Duke of Northumberland was constructed in the 16th century and the Longford River in the 17th century



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existing Airport boundary as part of the Terminal 5 development and currently form the 'Twin Rivers'.

- 18.6.14 The River Crane is located to the east of Heathrow, with the majority of the existing Heathrow site lying within its catchment. The headwaters of the River Crane lie to the north of the Grand Union Canal. It flows from north to south past Heathrow, then turns to the east through Twickenham and north into Isleworth, where it converges with the tidal River Thames.
- 18.6.15 Several surface water reservoirs are located in the west and southwest of the LSA. These include: the Queen Mother Reservoir, Wraysbury Reservoir, King George VI, Staines Reservoirs and Queen Mary Reservoir. All of these reservoirs are artificial, embanked water bodies that are supplied by water abstracted from the River Thames. They are used by Thames Water for public water supply.
- 18.6.16 In addition to the reservoirs there are numerous other lakes, the majority of which are old gravel pits. These are typically off-line from the main rivers (although in hydraulic continuity through the gravels), although a few are on-line with the Horton Brook and Colne Brook. They are most concentrated in the southwest of the study area, between the village of Horton and the River Thames, and in the vicinity of the M4/M25 junction (these latter include Saxon Lake, Old Slade Lake and others). These are shown in Figure 18.2.

Hydrogeology

- 18.6.17 The geological sequence of superficial and bedrock strata beneath the GWSA is introduced in paragraph 18.6.4 and described further in **Chapter 14: Land quality** (Section 14.7: Likely significant effects requiring assessment). The Environment Agency aquifer designations for these strata are presented in Table 18.5 (bedrock¹³) and Table 18.6 (superficial¹⁴) together with Environment Agency aquifer designations. Maps of the surface extent of these strata can be found in Figure 18.4 (bedrock) and Figure 18.5 (superficial).

Table 18.5 Environment Agency aquifer designations for bedrock strata in the GWSA

Formation	Environment Agency designation	Hydrogeological characteristics
London Clay	Unproductive ¹⁵	Aquitard

¹³ A term used for the main mass of rocks forming the Earth and present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water

http://www.bgs.ac.uk/products/digitalmaps/digmapgb_solid.html

¹⁴ These are more recent unconsolidated sediments including gravels, sands and clays commonly associated with glacial deposition or current and former river channels and their floodplains

¹⁵ Unproductive - low permeability rocks with negligible significance for water supply



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Formation	Environment Agency designation	Hydrogeological characteristics
Lambeth Group	Secondary A Aquifer ¹⁶	Aquifer. Clay, silt and sands, variable hydraulic conductivity, likely to be in hydraulic continuity with Chalk to some extent
Chalk	Principal Aquifer ¹⁷	White Chalk- Fractured limestone aquifer with flints and hard nodular beds Grey Chalk- Low permeability marl-rich limestone aquitard, glauconitic at base

Table 18.6 Environment Agency aquifer designations for superficial strata in the GWSA

Formation	Environment Agency designation	Hydrogeological characteristics
Alluvium	Secondary A Aquifer	Variable hydraulic conductivity clay, silt, sand and gravel aquifer
Langley silt	Unproductive	Aquitard. Low permeability clays and silts
Pleistocene river terrace deposits: <ol style="list-style-type: none"> 1. Shepperton Gravel Member 2. Kempton Park Gravel Member 3. Taplow Gravel Member 4. Lynch Hill Gravel Member 	Principal Aquifer	Sand and gravel aquifer, with variable hydraulic conductivity depending on lenses of clay and silt. Hydraulic continuity between adjacent terraces may be limited by vertical and lateral heterogeneity
Pleistocene river terrace deposits: <ol style="list-style-type: none"> 1. Boyn Hill Gravel Member 2. Black Park Gravel Member 	Secondary A Aquifer	Sand and gravel aquifer, with variable hydraulic conductivity depending on lenses of clay and silk. Largely hydraulically disconnected from younger river terrace deposits due to physical separation

¹⁶ Secondary A Aquifer - presenting a range of permeability and storage capacity. The amount of water available from such an aquifer is usually limited, and water supply stays at a local scale, in some cases forming an important source of base flow to rivers.

¹⁷ Principal Aquifer - composed of rocks with a high intergranular and/or fracture permeability. These aquifers provide a high level of water storage, and a significant amount of water that can support water supply, baseflow rivers, lakes or wetlands on a strategic scale.



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- 18.6.18 The Chalk is a nationally important groundwater resource, and as such is designated as a Principal Aquifer. It is overlain by, and likely to be in some degree of hydraulic continuity, with the clayey sediments of the Lambeth Group. The Chalk and Lambeth Group are confined across much of the GWSA by the London Clay aquitard which may be up to 80m thick beneath Heathrow and hydraulically separates the bedrock aquifers from the overlying superficial aquifers. The main outcrop of the Chalk and Lambeth Group lies to the northwest, dipping below the London Clay along the northwest boundary of the GWSA. A 'window' exposing the Chalk also occurs west of the DCO Project, where the Chalk is directly overlain by alluvium and the Shepperton Gravel, allowing hydraulic interaction.
- 18.6.19 In addition, deep glacial scour hollows have been documented in the London Clay infilled with alluvium and river gravels. Thinning or even absence of the London Clay in these areas may lead to locally increased hydraulic continuity with the underlying bedrock aquifers. Two such scour hollows have been documented in the vicinity of Heathrow: one at Old Slade Lake, and one close to the M25/M4 interchange, north west of Junction 4 of the M4¹⁸. Other unknown scour hollows may also exist.
- 18.6.20 Overlying the London Clay, the oldest two members of the river terrace gravels are designated as a Secondary A Aquifer and the younger four members are designated as a Principal Aquifer (Table 18.6): this is based on their use in providing public water supply on a strategic scale. The river terrace gravels in the entire GWSA are classified by the Environment Agency as a Drinking Water Protected Area.

Groundwater levels

- 18.6.21 Regionally, there is believed to be limited groundwater flow from the recharge zone of the unconfined Chalk outcrop northwest of the DCO Project into the confined Chalk below the DCO Project, with flow preferentially emerging at springs and seepages along the margin where the Chalk and Lambeth Group become confined. Sub-artesian conditions are likely to exist within the confined Chalk below the DCO Project with an upward vertical hydraulic gradient between the Chalk and superficial Pleistocene river terrace gravels, through the London Clay. Chalk groundwater levels beneath the site are thought to be at 15-20mAOD, based on regional contouring by the Environment Agency. This will be confirmed by site investigation in 2018-19.

¹⁸ Jacobs (2015). Geotechnical and Geo-environmental Desk Study - Report Western Link to Heathrow Desk Study



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- 18.6.22 Available data (from Environment Agency data and regional contouring)¹⁹ indicates that the water table in the river terrace gravels is generally within a few metres of ground level across the GWSA, and at or near the ground surface across the flood plain of the River Thames. Groundwater flows regionally towards the River Thames to the south and east, following topography.
- 18.6.23 Groundwater hydrographs in gravel boreholes are relatively smooth with seasonal fluctuations of <0.5-1.5m and no discernible long-term trend. This is consistent with the high specific yield and high hydraulic conductivity of the gravels, and the small unsaturated zone. Hydrographs located close to the River Thames clearly show the control of the river on groundwater levels.
- 18.6.24 The Pleistocene river terrace gravels are vertically and laterally heterogeneous, with physical separation between adjacent gravel terraces in places. Increased hydraulic gradients between adjacent gravel terraces have been suggested to exist east of the Colne Valley, implying reduced hydraulic continuity. Within the Colne Valley and to the west no clear differences in hydraulic gradient are apparent, with the gravel terraces thought to behave as one groundwater body¹².

WFD water bodies

- 18.6.25 The River Basin planning process (as introduced in Section 18.2: Policy and legislation) has defined specific river water bodies (and their catchments), lake water bodies, artificial water bodies (e.g. water transfer channels, canals), groundwater bodies, transitional water bodies (estuaries) and coastal water bodies. The aim of the WFD is for all water bodies to achieve Good Status (comprised of scores for Ecological Status and Chemical Status) and to ensure no deterioration from current status. In certain situations, considerations of technical infeasibility or disproportionate cost could lead to an objective of less than Good. This is documented in the relevant RBMP, which, in the case of the DCO Project, is the Thames RBMP.
- 18.6.26 Rivers, lakes and artificial water bodies can also be designated as Heavily Modified Water Bodies (HMWB) or Artificial Water Bodies (AWB). A HMWB is a water body that has been significantly modified for human use (for example for the purposes of flood defence, land drainage or urbanisation), and an AWB is an artificially created water body that is used for a specific water related purpose (such as the transfer or storage of water). Though all HMWBs/AWBs also have a target of Good, their altered nature means that the target is for Good Ecological Potential, rather than Status. Good Ecological Potential can be defined by the achievement of a set of mitigation measures (appropriate to the reasons for

¹⁹ Naylor, J.A., 1974. The Groundwater Resources of the River Gravels of The Middle Thames Valley. Water Resources Board, Reading



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modification) as well as those supporting elements of Good Ecological Status which are not compromised by the reason for modification.

- 18.6.27 The WFD waterbodies in the study area (including the LSA, WSA and GWSA) are shown in Figure 18.6. Further details of the supporting elements of Ecological Status for each water body can be found in **Appendix 18.5: WFD waterbodies**.

Rivers, lakes and artificial water bodies

- 18.6.28 As shown in Figure 18.6, the majority of the surface water features are all designated as WFD water bodies (either alone or as a component part). The exceptions to this are some of the smaller lakes, though these still lie within the wider catchments of WFD river water bodies. With the exception of the River Crane and the Horton Brook, all rivers in the LSA are designated as HMWBs, for the purposes of urbanisation and/or flood defence. The reservoirs, Grand Union Canal, Duke of Northumberland's River and Longford River are all designated as AWBs. All water bodies in the LSA are designated as currently being at less than Good Status. In the WSA some water bodies in the upper reaches of the Colne are classified as natural (non-HMWB) water bodies, while the freshwater River Thames downstream of the site is designated as an HMWB. The water bodies in the LSA and WSA are listed in **Appendix 18.5** and can be seen on Figure 18.1 and Figure 18.6. **Appendix 18.5** also contains more detailed information on their current status and objectives, including their water quality, hydromorphology and dependent ecology.

Groundwater bodies

- 18.6.29 The DCO Project is underlain by the Lower Thames Gravels groundwater body (refer to Figure 18.6), which defines the extent of the GWSA. This is defined by a number of Pleistocene river terrace gravel deposits (Table 18.6) which extend east-west from Windsor to Richmond and north-south from Hillingdon to Walton-on-Thames. This groundwater body is currently defined as being at Good Status with respect to water quality, water availability, saline intrusion risks and its ability to support water dependent designated sites. **Appendix 18.5** contains more detailed information on the current status and objectives of this water body.

Transitional water bodies

- 18.6.30 The Thames Upper component of the River Thames Transitional Water Body delineates the downstream extent of the WSA and is immediately downstream of the River Crane. **Appendix 18.5** contains more detailed information on the current status and objectives of this water body.



Flood risk

- 18.6.31 Within the LSA and WSA there are a range of sources of flood risk, including:
1. Fluvial flood risk along the courses of the rivers in the Colne and Crane catchments and the non-tidal River Thames
 2. Tidal flood risk along the course of the tidal River Thames
 3. Groundwater flood risk associated with area of higher groundwater levels
 4. Surface water flood risk associated with accumulation of runoff in localised depressions and urbanised areas
 5. Artificial sources of flood risk including impoundments (e.g. reservoirs), canals and the sewer network.
- 18.6.32 The risks listed above are relevant to both the LSA and WSA, with the exception of tidal flood risk, which is relevant only to the tidal section of the River Thames included in the WSA. This poses no risk of flooding to the DCO Project, and consequently is scoped out and not mentioned further in this section.
- 18.6.33 Though risks are present throughout the WSA the remainder of this baseline section focusses on the sources of flood risk to the LSA as this is the area where there is an intersection between areas of flood risk with the elements of the DCO Project (as described in **Chapter 3: The DCO Project**). All relevant sources of flood risk are considered.

Fluvial flood risk

- 18.6.34 Figure 18.7 shows fluvial (river) flood risk across the LSA which indicates that the most extensive areas of fluvial risk are associated with the freshwater Rivers Thames and Colne.
- 18.6.35 Figure 18.8 shows the fluvial risks in the LSA, which are associated with the natural rivers in the Colne Valley and River Crane. In some reaches, areas of flood zone 2 or 3 associated with these rivers are largely confined to narrow zones adjacent to the channels, as well as partially or wholly corresponding to lakes and ponds and their immediate surrounding areas. However particularly at the downstream end of the Colne Valley, from Horton downstream on the Horton Brook and Colne Brook, and at Staines Moor, there are widespread extents of floodplain.



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Surface water flood risk²⁰

18.6.36 There are many localised areas of surface water flood risk in the LSA, which have been mapped by the Environment Agency. This includes areas confined to the flowpaths of existing surface watercourses and drainage channels, along with other instances of isolated areas where ponding may occur. Areas of surface water flood risk will be mapped and discussed in more detail for the Preliminary Environmental Information Report (PEIR) and ES, as the DCO Project develops.

Groundwater flood risk

18.6.37 There are areas of increased potential for elevated groundwater in the LSA, which could have the potential to cause flooding at the surface or to sub-surface structures such as basements. Areas at risk of groundwater flooding have been mapped by the Lead Local Flood Authorities (LLFAs)²¹. In particular, the area around Colnbrook and Poyle in the Colne Valley is understood to be susceptible to groundwater flooding, and under periods of high rainfall groundwater levels in the alluvium and gravels can rise quickly (Slough Borough Council, 2014)²². It has been suggested that groundwater flow through this area may be impeded by a reduction in the aquifer cross-sectional area due to the presence of landfills and other developments including the raised reservoirs (Slough Borough Council, 2013)²³. Areas of groundwater flood risk will be mapped and discussed in more detail for the PEIR and ES, as the DCO Project develops.

Risks of flooding from reservoirs and other artificial sources

18.6.38 Flooding within the LSA could occur as a result of reservoir embankments being breached. Hypothetical scenarios in which the reservoir embankments are breached have been mapped by the Environment Agency, which show potentially extensive flooding associated with the reservoirs in the southwest of the LSA. The probability of a reservoir causing flooding is dependent on the structural and geotechnical conditions of the reservoir embankments. The operation and maintenance of the reservoirs is regulated by the Reservoirs Act 1975, which ensures that the design was fit for purpose, and that maintenance, including frequent inspections of reservoir embankments ensures the condition of the embankments. As such, the chance of them failing and giving rise to flooding problem is remote.

²⁰ Surface water flooding occurs when rainwater does not drain away through the normal drainage systems or soak into the ground, but lies on or flows over the ground instead. Managing the risk of flooding from surface water is the responsibility of lead local flood authorities (LLFAs).

(<https://www.gov.uk/government/publications/flood-risk-maps-for-surface-water-how-to-use-the-map>)

²¹ The relevant local authorities and LLFAs are identified in Appendix 18.4, along with a list of relevant flood-related documents held by each organisation.

²² Slough Borough Council, Section 19 Flood Investigation: Colnbrook Flooding, 2014

²³ Slough Borough Council, Local Flood Risk Management Strategy for Slough, 2013



- 18.6.39 A further potential artificial source of flood risk is from the canal network located north of the M4, with the nearest point being the Grand Union Canal in West Drayton. If there were to be a breach of the canal structures in this area then water discharged from the breach would flow south, likely making its way into the fluvial network. The likely maximum volume of water discharged would be limited by control structures that bound individual canal reaches, such that it is unlikely to prevent a major risk to flooding in the vicinity of the Project.
- 18.6.40 The Hillingdon PFRA shows that there have been no recorded instances of sewer flooding within the area local to Heathrow. However, the available information is based on records through to 2008: additional records will be sought from the other relevant LLFAs, Thames Water and other sewerage undertakers in order to provide a more complete picture of sewer flood risk.

Protected sites

- 18.6.41 Protected sites are identified and discussed in **Chapter 6: Biodiversity**. Some of those sites contain water-dependent habitats (e.g. reservoirs, lakes and wetlands). As identified within **Chapter 6: Biodiversity**, the study area across which protected sites are identified and assessed will evolve as the design phases and technical assessments progress. This will ensure that all relevant (i.e. water dependent) sites within the LSA, WSA and GWSA are considered.

Abstractions and discharges

Abstractions

- 18.6.42 Licensed abstractions within the LSA, downstream reaches of the WSA, and the GWSA are listed in **Appendix 18.6: Abstractions** and shown in Figure 18.9. These include abstractions for a range of purposes including agriculture, industry and public water supply. The largest abstractions are for public water supply from the River Thames at Teddington and Egham. In summary:
1. Within the LSA and downstream WSA there are 14 surface water abstraction licenses, with a total of 24 abstraction points. The distribution between different WFD water bodies is shown in **Appendix 18.6**
 2. Within the GWSA there are 68 groundwater abstraction licences, with a total of 129 abstraction points. 73 abstractions are from the river gravels, 33 are from the Chalk, while the remaining 22 are from an unspecified aquifer.
- 18.6.43 Within the GWSA there are three Groundwater Source Protection Zones (SPZs) defined for public water supply. There are two to the west of the DCO Project where the Chalk 'window' is exposed (abstraction from the Chalk and river



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gravels), and one from the river gravels to the south of the DCO Project. The extents of the SPZs are shown in Figure 18.9.

Discharges

18.6.44 Consented discharges within the LSA, downstream reaches of the WSA, and the GWSA are listed in **Appendix 18.7: Discharges** and shown in Figure 18.9. In summary:

1. Within the LSA and downstream WSA there are 155 discharges to surface water. The distribution between rivers is shown in **Appendix 18.7**
2. Within the GWSA there are 87 discharges to land.

Existing Heathrow operational water supply, foul drainage, run-off attenuation and treatment.

18.6.45 Water supply to the current site is provided by Affinity Water. Foul drainage from the current site is to the Thames Water operated drainage network.

18.6.46 Surface water run-off from the operational airfield is attenuated and treated, primarily for the removal of de-icing chemicals as well as hydrocarbons and other pollutants, before discharge. The current site is divided into four catchments for the purpose of runoff attenuation and treatment (as shown in Figure 18.10), these are described in more detail in the following sections.

Eastern Catchment

18.6.47 The Eastern Catchment flows through the Eastern Balancing Reservoirs (EBR) to the River Crane. This provides attenuation of flows before discharge to the River Crane, and treatment in the form of aeration, oil separation and settlement. The EBR also acts as the primary storage lagoon for the water for fire-fighting at the airport.

Southern Catchment

18.6.48 The Southern Catchment drains by gravity through a piped network to the Southern Balancing Reservoir (SBR), also known as Clockhouse Lane Pit (CLP). The CLP lake system outfalls to the Feltham Relief Sewer (and onto the Thames via the Portlane Brook) via a gravity connection with a pumped connection operating when water levels are high.

18.6.49 Treatment of surface water runoff from the Southern Catchment is primarily provided in the Heathrow Constructed Wetlands at Mayfield Farm (described in paragraph 18.6.50). The quality of the surface water runoff is tested at a diversion chamber, and when exceeding the quality thresholds, is diverted into the wetland facility. When the thresholds are not exceeded, the water continues to CLP. The



quality is tested again at the outfall to the CLP, and if exceeding the thresholds, is diverted to the Surface Water Outfall Tunnel (SWOT) pump station and transferred to the Spout Lane Lagoon (both described below), for discharge to Thames Water sewers.

- 18.6.50 The Heathrow Constructed Wetlands Facility at Mayfield Farm is an actively managed facility which utilises sustainable reed bed treatment processes to treat contaminated flows arising from the airfield. The facility comprises a number of elements, including balancing storage, high intensity aeration, and reed beds, and is currently effective at reducing contamination to levels suitable for discharge to the CLP.

Western Catchment

- 18.6.51 The Western Catchment was created as part of the Terminal 5 development. Surface water run-off from the new catchment was designed to drain by gravity to a new 3m diameter, 4km long, 15m deep tunnel which itself drains towards the CLP and is referred to as the SWOT. Flows are tested when they reach the CLP and contaminated flows are diverted back to the Spout Lane Lagoon, a raised holding reservoir southwest of the Western Catchment. From here, contaminated flows are pumped to a Thames Water sewer for transfer to and treatment at their Mogden Sewage Works. Clean runoff is lifted (or flows under surcharge during large rainfall events) back into the SWOT and then into the CLP. This complex system provides for the removal of contaminated runoff from the drainage system and ensures that flow reaching the rivers network is adequately attenuated by a combination of the SWOT and the CLP.

North-Western Catchment

- 18.6.52 The North-Western Catchment covers a relatively small proportion of the Heathrow's drainage system, and mostly serves landside development located outside of the airfield itself. As a result, surface water arising from this catchment is largely unaffected by airside activities and associated sources of pollution, meaning that additional treatment for de-icing and other airport contaminants is not required.
- 18.6.53 Surface water drains to the North-West Balancing Pond and is used as a source of water for part of the airport fire fighting system around T5. When the pond top water level is exceeded, water is drained out via an inverted siphon under the Duke of Northumberland's River into a ditch and then through a culvert under the M25, prior to discharge to the Wraysbury River under gravity.



18.7 Likely significant effects requiring assessment

- 18.7.1 This section describes the likely significant effects from the DCO Project that may require further assessment.
- 18.7.2 Effects have been considered against potential water environment receptors. The receptors are as described in Section 18.5: Sources of data used in scoping and have been grouped for the purpose of discussion in this Scoping Report. The grouping is shown in Table 18.7 and Figure 18.11. The receptor groups may be revised at later stages of assessment to better facilitate the PEIR and ES assessments.

Table 18.7 Receptor groups

Receptor group	Potential receptors included within group
WE1: Horton Brook	Horton Brook and its tributaries All surface water abstractions and discharges and relevant protected sites within the Horton Brook catchment People, property or infrastructure at risk of flooding from Horton Brook
WE2: Colne Brook	Colne Brook and its tributaries, including the Poyle Channel All surface water abstractions and discharges and relevant protected sites within the Colne Brook catchment People, property or infrastructure at risk of flooding from Colne Brook
WE3: Wraysbury River	Wraysbury River and its tributaries, including the Bigley Ditch All surface water abstractions and discharges and relevant protected sites within the Wraysbury River catchment People, property or infrastructure at risk of flooding from the Wraysbury River
WE4: River Colne (local)	The extent of the River Colne and its tributaries located within the Colne (Confluence with Chess to River Thames) water body and the Surrey Ash water body, excluding the distributaries covered in receptor groups WE3 and WE5. Includes the Grand Union Canal within the Colne (Confluence with Chess to River Thames) water body catchment extent. All surface water abstractions and discharges and relevant protected sites within the WFD water body Colne (Confluence with Chess to River Thames) catchment, excluding the distributaries covered in receptor groups WE3 and WE5. People, property or infrastructure at risk of flooding from the River Colne.
WE5: Twin Rivers	Duke of Northumberland's River and Longford River from their bifurcation from the River Colne to the Duke of Northumberland's River's confluence with the Crane and the Longford River's confluence with the Thames.
WE6: Portlane Brook	The extent of the Portlane Brook water body, including Felthamhill Brook. All surface water abstractions and discharges and relevant protected sites within the water body catchment. People, property or infrastructure at risk of flooding from Portlane Brook.



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Receptor group	Potential receptors included within group
WE7: River Crane	Crane WFD water body and its tributaries, including the Lower Duke of Northumberland's River. All surface water abstractions and discharges and relevant protected sites within the Crane catchment People, property or infrastructure at risk of flooding from the Crane
WE8: Freshwater River Thames	River Thames reaches included in the water bodies Thames (Cookham to Egham) and Thames (Egham to Teddington). Abstractions and discharges from and to the River Thames between Cookham and Teddington. People, property or infrastructure at risk of flooding from the River Thames between Cookham and Teddington.
WE9: Tidal River Thames	The stretch of the tidal Thames immediately downstream of the confluence with the River Crane.
WE10: Upper River Colne	The full catchment of the River Colne and its tributaries upstream of the Chess confluence (WE4), including the Grand Union Canal.
WE11: Reservoirs	All raised artificial reservoirs within the LSA.
WE12: Lower Thames Gravels	Full lateral extent of the Lower Thames Gravels groundwater body. All groundwater abstractions within the Lower Thames Gravels catchment area. All protected sites with potential groundwater dependency within the Lower Thames Gravels catchment area. All lakes and ponds with potential connectivity to the gravels. People, property or infrastructure at risk of groundwater flooding from the Lower Thames Gravels
WE13: Bedrock aquifers	Aquifers beneath the London Clay, including the Chalk and Lambeth Group, within the lateral extent of the GWSA.
WE14: Local water supply	Affinity Water maintained assets around the boundaries of the airfield and Heathrow maintained assets on the airfield.
WE15: Foul drainage infrastructure	Thames Water maintained assets around the boundaries of the airfield and Heathrow maintained assets on the airfield.

18.7.3 The likely effects associated with one or more receptor groups are listed in Table 18.8. Unless otherwise indicated in Table 18.8, all effects are relevant to both the construction and operation phases.

18.7.4 At this stage of the assessment all potential effects on the water environment have been scoped in as “likely significant effects” with the exception of the risk from tidal flooding (refer to Section 18.8: Effects not requiring assessment). The identification of likely significant effects will continue to be refined once further development details are confirmed and more detailed source-pathway-receptor conceptualisations can be built.



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18.7.5 The types of effects that have been considered in this section include physical changes to water courses or other water bodies, changes to flood risk, runoff, river flows, groundwater flows and levels or water quality. Effects on water resources and waste water have also been considered. The following likely effects on receptors associated with the water environment have been accounted for elsewhere in this Scoping Report:

1. Likely effects relating to fish passage, other aquatic ecology and the flora and fauna associated with water dependent designated sites are addressed in **Chapter 6: Biodiversity**
2. Likely effects relating to the mobilisation of on-site contaminants into surface and groundwater are addressed in **Chapter 14: Land quality**.

Table 18.8 Likely significant effects requiring assessment

Activity	Effect	Receptors
Likely effects on surface water quantity/flow (high and low flows, including flood risk)		
Change in land use River diversions	Changes to channel routing Modification (by the proposed runway location) of existing routes of the Colne Brook, Wraysbury River, River Colne, Duke of Northumberland's River and Longford River. Realignment of all of these rivers would be required, with new channels being created. A covered river corridor would pass beneath the new runway. Associated loss of ecological connectivity with upper catchment (refer to Table 6.10 in Chapter 6: Biodiversity).	WE2, WE3, WE4, WE5 WE10
Change in land use River diversions	Loss of floodplain storage and changes to the extent of the fluvial flood plain Loss of floodplain storage associated with channel route modification and realignment (as above) and consequent changes in the fluvial floodplain for up and downstream receptors.	WE2, WE3, WE4, WE5
Change in land use Operation of drainage system	Increased runoff Increased area of impermeable surfaces including runway, taxiways, aprons, buildings and other areas of	WE2-WE8



Activity	Effect	Receptors
<p>Construction sites and associated activities</p> <p>Dewatering during construction</p>	<p>hardstanding. Associated increased potential for runoff.</p> <p>Potential for runoff to be captured in drainage systems and released to a different catchment, for example the discharge of rainfall that falls in the catchment of the River Crane into the River Colne or Portlane Brook.</p> <p>Increased area of hardstanding and other unvegetated surfaces in construction working areas, and associated increased potential for runoff.</p> <p>Dewatering during construction (e.g. from borrow pits, earthworks, and tunnel and foundation construction), which could be released to surface waters.</p>	<p>WE3-WE7</p> <p>WE1-WE8</p> <p>WE1-WE8</p>
<p>Change in land use</p> <p>Operation of drainage system</p> <p>Construction sites and associated activities</p> <p>Dewatering during construction</p>	<p>Changes to baseflow Potential for altered flow regime downstream of diverted reaches, if flow is not redistributed according to baseline conditions.</p> <p>Potential for reduced flows to all surface water receptors associated with reduced groundwater flow and/or levels (as described below).</p> <p>Potential for increased flows from dewatering during construction, which could be released to surface waters.</p> <p>Managed release of runoff from drainage systems, which could be released to a different catchment.</p>	<p>WE2, WE3, WE4, WE5, WE7, WE8</p> <p>WE1-WE8</p> <p>WE1-WE8</p> <p>WE3-WE7</p>
<p>River diversions</p>	<p>Altered flow conveyance through flow diversions Shortening/ lengthening/ straightening of existing channel flowpaths. Modifications to cross-sectional capacity.</p>	<p>WE2, WE3, WE4, WE5</p>
<p>Change in land use</p> <p>River diversions</p>	<p>Changes to channel morphology (Operation only)</p>	<p>WE2, WE3, WE4, WE5, WE7</p>



Activity	Effect	Receptors
	All of the factors above, including the creation of new channels, alterations to channel form and length, and associated changes to the flow regime, could result in changes to erosion and deposition processes over time, altering channel morphology.	
Likely effects on surface water quality		
River diversions Construction sites and associated activities Dewatering during construction	Increased sediment loading to surface water (Construction only) Ground disturbance and associated sediment mobilisation associated with the construction of new river channels, the process of diverting flows in to those channels, and subsequent flow through new channels. Ground disturbance and dewatering from other construction areas.	WE2, WE3, WE4, WE5, WE7, WE8 WE1-8
River diversions	Reduction in surface water quality Transfer of water between different surface water bodies, associated with channel diversions and combining multiple channels. Changes to in-channel processes associated with flow through a covered river corridor. Changes to dilution capacity resulting from changes to baseflow.	WE2, WE3, WE4, WE5, WE7, WE8 WE3, WE4, WE5 WE3-WE7
Construction sites and associated activities Dewatering during construction Operational activities on and off airport including de-icing	Introduction of pollutants to surface waters Runoff from construction areas and/or new permanent impermeable surfaces, including runoff from areas where de-icing is carried out. Accidental spillage or leakage of fuels, lubricants or other chemicals required for construction and/or operation.	WE1-9 WE1-9
Aircraft movements Other vehicular traffic	Increased atmospheric deposition of pollutants to surface waters (Operation only)	WE1-WE8 (lakes only), WE11



Activity	Effect	Receptors
	Changes to air quality associated with increased emissions from aircraft and land-based vehicular traffic during the operational phase of the DCO Project	
Likely effects on groundwater quantity/flow		
<p>Change in land use</p> <p>Operation of drainage system</p>	<p>Reduced recharge (Operational phase only) Reduced and/or locally displaced recharge to the superficial gravel aquifer due to increased impermeable surfaces and collection of rainfall runoff in drainage systems, with subsequent release to surface waters.</p>	WE12
<p>Construction sites and activities</p> <p>Dewatering during construction</p> <p>Below-ground infrastructure</p> <p>River diversions</p>	<p>Changes to local groundwater flow and levels Construction activities such as the use of coffer dams or sheet piling and the development of borrow pits. Dewatering during construction. Extraction of gravels. Changes to the permeability of subsurface fill material.</p> <p>Influence of new or relocated permanent engineered structures, e.g. re-designed and or re-purposed landfill sites, basements, tunnels, pipelines and any other sub-surface structures (e.g. an airfield drainage network).</p> <p>Realignment of rivers and other surface water bodies such as flood storage areas</p>	WE12, WE13
Likely effects on groundwater quality		
<p>Construction activities</p> <p>Dewatering during construction</p> <p>Operational activities on and off airport</p>	<p>Changes to groundwater quality Accidental spillage or leakage of fuels, lubricants or other chemicals required for construction and/or operation at the surface, with infiltration to the superficial aquifer. Where pathways exist or are created, there is some potential for contamination to reach the Lambeth Group/Chalk.</p>	WE12, WE13
Water supply and foul drainage infrastructure		



Additional baseline information required

- 18.9.3 The baseline information in the PEIR and ES will be supplemented from the following sources:
1. Further desk based data collation
 2. Further baseline surveys, as listed in Table 18.10. These surveys are primarily located in the LSA and focused around the different elements of the DCO Project, as defined in **Chapter 3: The DCO Project**
 3. Quantitative baseline characterisation using models for flood risk, groundwater flow and surface water quality (in rivers and lakes).

Table 18.10 Site baseline data collection and surveys

Data type	Purpose of survey/data collection	Survey stage
Ground Investigation (refer to Chapter 14: Land quality). Borehole drilling understand geology and hydrogeology	Improving groundwater baseline conceptualisation. Groundwater Model Calibration.	Borehole drilling has started on site and initial data are being collected. It is anticipated that the full monitoring network will be installed by mid-2018.
Groundwater Quality monitoring	Improving groundwater baseline conceptualisation.	Groundwater quality monitoring network covering a subset of the boreholes drilled in the ground investigation work, rolled out along similar timescales (refer to Chapter 14: Land quality).
Surface water Quality Monitoring of rivers and lakes.	Improving surface water quality baseline conceptualisation. Surface Water Quality Model Calibration	Monthly monitoring commenced in December 2017 across c.100 sites.
River Accretion profiles	Improving understanding of baseline interaction between ground and surface waters. Groundwater Model Calibration.	Accretion surveys of Horton Brook, Colne Brook, Poyle Channel, Wraysbury River, River Colne, Duke of Northumberland's River, Longford River and River Crane undertaken in November 2017. Two further surveys are planned for 2018.
Continuous flow and level gauging	Improving hydrological baseline conceptualisation. Flood and hydrology model calibration.	Monitoring equipment will be installed by mid-2018.



Data type	Purpose of survey/data collection	Survey stage
Geomorphological walkovers	To improve the baseline understanding of river morphology and how the rivers interact with their riparian zones. To identify areas for improvement through mitigation.	Walkover surveys of all accessible land have been undertaken in 2017 and 2018.
River bank height longitudinal surveys and river cross sections	To improve the understanding of river channel structure to inform the flood modelling.	This work will be undertaken by mid-2018.

- 18.9.4 All baseline models will be calibrated using historic site data, including that collected for the purposes of the DCO Project. Information on the calibration and sensitivity testing will be included with the PEIR and ES and be subject to scrutiny from the Environment Agency and other relevant stakeholders prior to the undertaking of any impact assessment.
- 18.9.5 In addition, as described in Section 18.4, should the study area change in response to the evolving design, the need for any additional baseline data for the water environment will be reviewed and updated.

Assessment years

- 18.9.6 The water environment assessment will be divided into a number of assessment years covering the current baseline, future baseline (without the DCO Project), enabling works, construction phase(s) and operational phase of the development.
- 18.9.7 The current baseline for the water environment assessment will be established using the Desk Study, site investigation data (refer to paragraph 18.9.3) and modelling (refer to Section 18.10: Approach to mitigation).
- 18.9.8 The future baseline will consider both changes that may occur to the baseline prior to construction work commencing, and those that would occur further in the future in the absence of the DCO Project. In particular this may include works being undertaken to improve the condition of watercourses in line with WFD objectives, changes to the surface water or groundwater regime that are predicted to occur as a result of climate change and Heathrow development taken forward in the absence of the DCO Project.
- 18.9.9 Due to the anticipated scale of the development, the construction schedule will extend over a number of years. Accordingly, both the baseline conditions and the effects are expected to be continuously evolving, particularly as elements of the scheme such as the major earthworks, river diversions and new roads are constructed. To take account of this, the assessment of water environment effects



during enabling works and construction will be undertaken for a number of different phases. The assessment will cover the year of maximum effect from construction activities (as defined in Section 4.3: Spatial and temporal scope). Additional years may be incorporated, if necessary, to account for factors such as the peak earthworks phase, peak above ground infrastructure construction phase and pre- and post-river diversions.

- 18.9.10 The operational phase assessment of significant water environment effects will be assumed to apply from the year of opening (as defined in Section 4.3). However, consideration will be given to how operational phase effects (both from built development and operational activities) may change over time, to determine whether an alternative year of maximum effect (as defined in Section 4.3) should be assessed. This will consider potential changes to operation over time, time for mitigation to reach maturity, and changes in the future baseline (e.g. due to climate change) over time. Further information on how climate change is being taken into account in the water environment assessment can be found in **Chapter 8: Climate change** and **Appendix 18.4**.

Assessment methodologies

- 18.9.11 The assessment of effects on the water environment will be underpinned by quantitative and qualitative analysis and a number of technical assessments. Table 18.11 lists those assessments which will address both construction and operation phase effects and Table 18.12 lists those which are only relevant to the operation phase. Where a methodology has already been developed for the assessment this can be found in the referenced appendix in the tables.
- 18.9.12 Assessments are common to both the construction and operational phase where the baseline conceptualisation and the modelling of source-pathway-receptor linkages is appropriate for all stages of the assessment. Those assessments listed in Table 18.12 are relevant for the operation phase only because they relate to the assessment of the impact of operational phase infrastructure.
- 18.9.13 Assessments will take into account national legislation and national and local plans and policies.

Table 18.11 Assessments supporting the assessment of effects on water environment receptors in the construction and operational phases

Assessment	Description
A1: Groundwater Impact Assessment	This assessment will present the results of the assessment of the effects and effectiveness of embedded design and additional mitigation measures on groundwater receptors in the construction and



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Assessment	Description
	operation phases. The assessment will be supported by a numerical groundwater model of the gravel aquifer. The approach to this assessment can be found in Appendix 18.2 .
A2: Water Framework Directive Assessment	This assessment will present the effects associated with the DCO Project on the objectives of the WFD within the water bodies in the study area. This will include effects on overall ecological status classification and individual element classification for hydromorphology, water quality, water availability and ecology for surface water bodies, and quality and quantity of water in the groundwater body. It will assess construction and operational phase impacts which are identified as having the potential to compromise WFD objectives, either by causing a deterioration in status or by preventing the achievement of WFD objectives. The assessment will also contain information on proposed mitigation measures, both those embedded into the scheme and a wider programme of additional mitigation measures in the Colne Valley and Crane catchment. The approach to this assessment can be found in Appendix 18.1 .
A3: Flood Risk Assessment	This assessment will present the results of the assessment to ensure ANPS and NPPF compliance and demonstrate that there will be no increase in flood risk as a result of the DCO Project, including accounting for climate change. This assessment will cover all sources of flood risk – fluvial, surface water (rainfall), sewer (Thames Water and private), tidal, groundwater and artificial (reservoirs and canals) and will be supported by numerical modelling where appropriate. A8 will form an appendix to the operational phase assessment. The approach to this assessment can be found in Appendix 18.4 .
A4: Surface water quality Assessment	This assessment will present the results of the assessment of the impact of effects on surface water quality of rivers and lakes, though atmospheric deposition (lakes only) and runoff. This will include an assessment of the effectiveness of operation phase onsite drainage attenuation and treatment facilities on surface water quality as well as construction phase permitted discharges. The approach to this assessment can be found in Appendix 18.3 .
A5: Quantitative Risk Assessment	This assessment is described in more detail in Chapter 14: Land quality and will address the effects



Assessment	Description
	<p>of the DCO Project on ground and surface water quality. This assessment will draw on information from A1 and A4 to present an overall picture of potential water quality risks. The approach to the controlled waters assessment can be found in Appendix 14.1: Land quality approach to human health and controlled waters risk assessment.</p>
<p>A6: Habitat Regulations Assessment</p>	<p>This assessment is described in more detail in Chapter 6: Biodiversity and will assess the impact of the DCO Project on the Lower Thames Water Bodies SPA, with respect to their designated features and supporting habitat. This assessment will draw on information in A2 and A4 (with respect to lake water quality). The approach to this assessment can be found in Chapter 6: Biodiversity, Section 6.9: Proposed approach to the assessment.</p>
<p>A7: Resources Management Plan</p>	<p>This assessment will detail water resource management in construction and operations in response to an assessment of the likely demand on resources arising from the DCO Project. This assessment will address how the site will interact with Affinity Water infrastructure for water supply. It will identify the measures to be put in place to maximise the potential for efficient use of water on site, and the focus will be on the use of non-potable sources wherever possible including grey water re-use measures to minimise the water footprint of the site. This strategy will be developed in consultation with Affinity Water and take account of the supply/demand balance in their most recent Water Resource Management Plan which factors in future pressures such as climate change and population growth.</p>

- 18.9.14 In addition the assessment of effects on the water environment in the construction phase will draw on elements of the plans and strategies that will be developed to support the construction phase earthworks strategies, which will include measures for dewatering run-off control and pollution prevention.



Table 18.12 Assessments supporting the assessment of effects on water environment receptors in the operational phase only

Assessment	Description
A8: Drainage Impact Assessment	This assessment will cover the operation phase of the development and present the results of the assessment of the impact of changes to site land cover on its drainage regime. The purpose of this assessment will be to identify the storage and treatment solutions for site run off, as well as indicating how SuDS techniques will be incorporated into the site drainage design and how exceedance events will be managed. That is how rainfall events can be properly attenuated on site and potential pollutants, such as de-icer, removed prior to site discharges.

18.9.15 Table 18.13 presents a summary of how these assessments will be used to assess the effects identified in Table 18.8.

Table 18.13 Linkage between assessments and likely effects

Assessment	Likely Effects					
	Surface water quantity/flow	Surface water quality	Groundwater quantity/flow	Groundwater quality	Water supply	Foul drainage infrastructure
A1: Groundwater Impact Assessment	√		√			
A2: WFD Assessment	√	√	√	√		
A3: Flood Risk Assessment	√					√
A4: Surface water quality Assessment		√				
A5: Quantitative Risk Assessment		√		√		
A6: Habitat Regulations Assessment		√				
A7: Resources Management Plan					√	
A8: Drainage Impact Assessment	√					√



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18.9.16 Cumulative water environment effects resulting from the combination of effects from the Scheme and other developments will be assessed in accordance with the approach set out in Section 4.6: Cumulative effects assessment.

Significance evaluation methodology

18.9.17 The assessment of significance will be undertaken as set out in **Chapter 4: Approach to EIA Scoping**. The significance level attributed to each effect has been assessed based on the magnitude of change due to the development and the sensitivity or value of the affected receptor / resource to resulting changes. Magnitude of change is assessed on a scale of high, medium, low and negligible, whilst the sensitivity of the affected receptor / resource is assessed on a scale of high, medium, and low. The criteria for defining sensitivity and magnitude can be found in Table 18.14 and Table 18.15, along with example applications. These criteria will be refined for the PEIR and ES as more information becomes available on specific site activities and their relationship with receptors. The level of significance is then determined by the combination of magnitude and sensitivity, as defined in **Chapter 4: Approach to EIA Scoping** and presented again in Table 18.16 (where cells highlighted in red are “significant”).

Sensitivity of receptor

18.9.18 Guidance on the categories and definitions of value and/or sensitivity of receptors, used in the assessment, are given in Table 18.14. Where a receptor could reasonably be placed within more than one value/sensitivity rating, conservative professional judgment has been used to determine which rating would be applicable.

Table 18.14 Definitions of receptor sensitivity

Value/ Sensitivity	Criteria	Examples
High	Water environment feature with a very high yield, quality or rarity with little potential for substitution. Water resources supporting human health and economic activity at a regional scale. Features with a very high vulnerability to flooding.	Conditions supporting sites with international conservation designations (Special Area of Conservation, Special Protection Area, Ramsar), where the designation is based specifically on water features. Strategically important groundwater Public Water Supplies. Land use types defined as ‘Essential Infrastructure’ (i.e. critical national infrastructure, such as essential transport and utility



Value/ Sensitivity	Criteria	Examples
		infrastructure) and ‘Highly Vulnerable’ (e.g. police/ambulance stations that are required to operate during flooding, mobile homes intended for permanent residential use) in the NPPF flood risk vulnerability classification.
Medium	Water environment feature with a high yield, quality or rarity with a limited potential for substitution. Water resources supporting human health and economic activity at a local scale. Features with a high vulnerability to flooding.	Conditions supporting sites with national conservation designations (SSSI, National Nature Reserve), where the designation is based specifically on water features. Relevant supporting elements of WFD Waterbody status. Licensed non-public water supply abstractions which are large relative to available resource, or where raw water quality is a critical issue, e.g. industrial process water. Land use types defined as ‘More Vulnerable’ in the NPPF flood risk vulnerability classification (e.g. hospitals and health centres, educational institutions, most types of residential development).
Low	Feature with a moderate or low yield, quality or rarity with some or good potential for substitution. Water resources supporting human health and economic activity at household/individual business scale. Water resources that do not support human health, and are of only limited economic benefit. Features with a moderate to low vulnerability to flooding. Features that are resilient to flooding.	Sites with local conservation designations (e.g. Local Nature Reserves (LNRs), County Wildlife Sites (CWS)), where the designation is based specifically on water features. Non-reportable WFD river water bodies, usually coastal catchments with an area of <10km ² that the EA is not required to monitor, classify or report on. Licensed non-public water supply abstractions that are small relative to the available resource, or where raw water quality is not critical e.g. cooling water, spray irrigation. Unlicensed abstractions e.g. private domestic water supplies. Land use types defined as ‘Less Vulnerable’ or ‘Water-compatible development’ in the NPPF flood risk



Value/ Sensitivity	Criteria	Examples
		vulnerability classification e.g. most types of business premises.

Magnitude of change

18.9.19 The magnitude of potential (pre-mitigation) or residual (post-mitigation) change to baseline conditions is based on an assessment of the scale or degree of change from the baseline condition. This includes a consideration of the duration and reversibility of the change, and relevant legislation and/or policy standards and guidance. Table 18.15 provides examples of how various magnitudes of change could be determined with respect to water features.

Table 18.15 Definitions of water environment magnitude of change

Magnitude	Criteria	Examples
High	Results in major change to feature, of sufficient magnitude to affect its use/integrity	Deterioration in river flow regime, morphology or water quality, leading to sustained, permanent or long-term breach of relevant SSSI conservation objectives (COs), or downgrading of WFD status (deterioration in current thresholds as defined by current WFD status, including supporting WFD elements). Complete loss of resource or severely reduced resource availability and/or quality, compromising the ability of water users to exercise licensed rights or failure of water company infrastructure. Change in flood risk resulting in potential loss of life or major damage to property and infrastructure. Measurable decrease in surface water discharge or increase in flood storage from baseline to provide significant catchment-wide betterment.
Medium	Results in noticeable change to feature, of sufficient magnitude to affect its use/integrity in some circumstances	Deterioration in river flow regime, morphology or water quality, leading to periodic, short-term and reversible breaches of relevant SSSI COs, or downgrading of WFD status (deterioration in current thresholds as defined by current WFD status, including supporting WFD elements). Water quality status may impact upon potential future thresholds in relation to objective WFD status – potential for prevention of waterbody reaching its future WFD objectives. Moderate reduction in resource availability and/or quality, which may compromise the ability of water users to exercise licensed rights or the functioning of water infrastructure. Change in flood risk resulting in potential for moderate damage to property and infrastructure.



Magnitude	Criteria	Examples
		Measurable decrease in surface water discharge or increase in flood storage from baseline to provide significant local betterment.
Low	Results in minor change to feature, with insufficient magnitude to affect its use/integrity in most circumstances	<p>Measurable deterioration in river flow regime, morphology or water quality, but remaining generally within SSSI COs, and with no change of WFD status (of overall status or supporting element status) or compromise of Environmental Quality Standards (EQSs).</p> <p>Minor reduction in resource availability and/or quality, but unlikely to affect the ability of water users to exercise licensed rights or water company infrastructure.</p> <p>Change in flood risk resulting in potential for minor damage to property and infrastructure.</p> <p>Measurable decrease in surface water discharge or increase in flood storage from baseline to provide minor local betterment.</p>
Negligible	Results in little or no change to feature, with insufficient magnitude to affect its use/integrity	<p>No measurable deterioration in river flow regime, morphology or water quality, and no consequences in terms of SSSI COs or WFD designations.</p> <p>No measurable change in resource availability or quality, and no change in ability of water users to exercise licensed rights or impacts on water company infrastructure.</p> <p>Change in flood risk causes more frequent inconvenience and triggering of emergency response measures, but does not result in increased risk of damage to property and infrastructure.</p> <p>No measurable decrease in surface water discharge or increase in flood storage from baseline to provide any betterment.</p>

Table 18.16 Determination of significant effects for the water environment

Magnitude	Receptor value/sensitivity		
	High	Medium	Low
High	Major	Major	Moderate
Medium	Major	Moderate	Minor
Low	Moderate	Minor	Negligible
Negligible	Minor	Negligible	Negligible

Red = significant. Green = not significant

18.10 Approach to mitigation

18.10.1 Sustainability and connectivity are two guiding principles which will inform the approach to the development of mitigation measures for the protection of water environment receptors. This focus has been the basis of the engagement of the water discipline with the wider design team, and this will continue throughout the



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on-going development of the DCO Project. These principles are discussed below, covering both the construction and operational phases of the DCO Project.

Delivering sustainability

- 18.10.2 Sustainability in this context focuses on the overall quality of the water environment in the wider river catchments rather than just that portion within the footprint of the DCO Project. The following mitigation measures will be embedded into the design, to ensure sustainability:
1. Re-provision for lost flood storage to ensure that there is no increase in flood risk to people and property during the lifetime of the development, including mitigation for the likely effects of climate change. Potential locations for these mitigation areas can be seen in **Chapter 3: The DCO Project**
 2. The management of surface water drainage and treatment of surface runoff to avoid pollution (e.g. removal of anti-icing chemicals). As discussed in **Chapter 3: DCO The Project**, options being considered include the extension of the current constructed water treatment facility at Mayfield Farm, the construction of new treatment areas to the west or north, or the construction of new water treatment facilities to serve both foul and surface water
 3. The development of a strategy to minimise the operational water resource demand from the site and the use of Sustainable Drainage Solutions (SuDS) to manage runoff from building and car park areas.

Delivering connectivity

- 18.10.3 Maximising the potential for ecological and hydraulic connectivity for the rivers affected by the DCO Project is integral to the mitigation strategy. The current channels of the Colne Brook, River Colne, Wraysbury River, Duke of Northumberland's River and Longford Rivers all fall within the site of the proposed new runway and airfield. To broadly maintain the courses of these rivers, current thinking is that covered river corridors will be required. To facilitate passage through the covered river corridor to the east of the M25, our current thinking is that the Colne and the Wraysbury Rivers would be combined into one channel and the Duke of Northumberland's and Longford River will be combined into another, slightly elevated, channel. This is to accommodate the current height differential between these rivers. The detailed design of the covered river corridors will include the consideration of introducing natural/artificial light, airflow and maintenance access requirements to promote connectivity for aquatic flora and fauna.
- 18.10.4 Connectivity also applies to the other elements of embedded mitigation in the following ways:



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1. Connectivity between surrounding habitats with the rivers through the use of vegetation growth on the channel margins, protecting these areas from development
2. Connectivity between the rivers and their floodplains through the improvement of riverside vegetated areas and the re-provision of lost flood plain storage
3. Connectivity for ecology within the river through the removal of in channel structures which, for example, provide barriers to fish passage
4. Connectivity for groundwater flows, around and through, the development footprint
5. Connectivity between river reaches through improvements to channel form and structure.

Incorporating new open channels

- 18.10.5 Options for additional open channels are also being considered. These range from an option to move the Colne Brook from under the proposed runway to a replacement open channel around the runway's western end, to more extensive western diversions of flow to deliver new river corridors.
- 18.10.6 The development of options takes into account where the rivers currently flow, their geomorphological characteristics, and how they are connected to their landscape.
- 18.10.7 The introduction of any new channels as an embedded mitigation measure would need to ensure that diversions of water do not compromise the connectivity of the current channel system to the wider environment. Further detail on how these mitigation measures could be integrated into the river options can be found in **Chapter 3: The DCO Project**.

Enhancement of the wider water environment

- 18.10.8 In line with the Consultation 1 document "Our Design Approach to the Natural Environment" the mitigation approach will seek to avoid deterioration of the current ecological condition around the airport whilst identifying opportunities to develop and enhance the wider water environment through additional mitigation measures in the LSA and WSA. It is in these areas, away from the immediate constraints of an operational airport where wildlife strike risk is reduced, that opportunities exist to enhance river health and open up land to create floodplain storage to protect people and properties whilst promoting biodiversity and recreational benefits. These areas of land also have the potential to be better connected to their rivers and thus promote more regular seasonal flooding which will sustain richer biodiversity through wetland habitat creation. Natural and semi-natural systems



perform several positive functions - these include infiltration; water quality; and increased potential to manage run-off and temporarily store flood flows. **Appendix 18.1** contains further information on how the WFD assessment will be used to drive mitigation measures across WFD water bodies.

Planning, monitoring and response

- 18.10.9 The mitigation strategy will also involve development of mitigation measures comprising the production of a number of plans which will detail the approach to the water environment to be incorporated into the activities associated with the construction and the operation of the DCO Project. Examples of possible plans are:
1. The draft Code of Construction Practice (CoCP). This will set out the standards that the contractors must adhere to when undertaking construction
 2. Spillage Environmental Response Plan. This provides procedures for the response to spillages which have the potential to pollute the water environment, as well as measures to safeguard aquatic ecology should a pollution incident occur
 3. Plans to control and manage the use of pesticides, herbicides and other chemicals used in habitat management and to prevent them being discharged to the water environment.
- 18.10.10 These plans will be underpinned by monitoring networks, these could comprise:
1. A water quality monitoring network which will provide triggers for the cessation of activities and the activation of response plans if water quality standards are breached at key monitoring locations
 2. A groundwater level/river flow monitoring network which will provide triggers for cessation of activities if water levels and flows drop below agreed levels at key receptors, for example water dependent designated sites.
- 18.10.11 Further detail will be provided on the incorporation of mitigation measures in plans, monitoring and response measures in the PEIR and ES.



Chapter 19

Outline structure of the ES



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19. OUTLINE STRUCTURE OF THE ENVIRONMENTAL STATEMENT

- 19.1.1 The next step in the EIA process after scoping will be the production of the Preliminary Environmental Information Report (PEIR) in late 2018. This document will provide information to allow consultees and the public to understand the likely significant environmental effects of the DCO Project when they are commenting on the proposals. It is proposed at this stage that the PEIR will follow, broadly, the same structure as the ES.
- 19.1.2 Advice Note Seven¹ advises applicants that the Scoping Report should provide an outline structure of what the ES will contain.
- 19.1.3 The structure of the ES will broadly follow the same order of chapters that are presented in the Scoping Report, acknowledging that changes may need to be made to address the requirements of the Scoping Opinion or the evolution of the project. The chapters are outlined in Table 19.1.

Table 19.1 Outline structure of ES

ES section	Likely content
1. Introduction	Applicant team and competency details Background to the DCO Project Overview of the features of the DCO Project Other assessments (e.g. ACP)
2. Planning policy and legislation	Legislative context National Policy Statements National planning policy and guidance Development plans Other relevant guidance and policies
3. Need for the development and alternatives considered	The need for the development Alternatives considered and environmental reasons for choice of preferred options
4. The site and surroundings	Description of the existing site and its surroundings
5. Description of the DCO Project	Relevant features of the development, size and location Associated development Other development Embedded environmental design measures

¹ Planning Inspectorate, Advice Note Seven: EIA: Process, Preliminary Environmental Information and Environmental Statements. Version 6. December 2017



ES section	Likely content
6. Approach to preparing the ES	The EIA process EIA scoping and evolution of the DCO Project Stakeholder engagement Identification of baseline conditions and assessment years Overview of assessment methodology Approach to significance evaluation Approach to cumulative effects assessment Airspace Change Process
7. Technical topic chapters	Approach to assessment Relevant components of the project Baseline data Assessment findings Mitigation proposed Cumulative effects
8. In-combination effects	The potential effects of more than one topic combined, presented at a project wide or community based level



Chapter 20

Glossary



20. GLOSSARY

20.1.1 The glossary to be read in conjunction with this Scoping Report is in Table 20.2, and abbreviations are in Table 20.2.

Table 20.1 Glossary for this Scoping Report

Term	Definition
Airports Commission	An independent Commission to identify and recommend options to maintain the UK's position as Europe's most important aviation hub ¹ .
Airside	The area of an airport which is beyond security and/or passport control.
Associated Development	This is defined by the Planning Act 2008 as 'development which is associated with the principal development subject to requirements'.
Capability	The ability of a system to perform as intended.
Capacity	A system's capability to accommodate a designated level of demand at a desirable level of service (e.g. waiting time, space per passenger, satisfaction score).
Colleagues	People employed by Heathrow Airport Ltd.
Consultation 1	Heathrow's first public consultation on the scheme. The consultation ran from 17 January to 28 March 2018 and was an opportunity to give feedback on options for the expansion of the airport.
Consultation 2	Heathrow's second public consultation on the scheme. The consultation will consult on the preferred scheme that Heathrow intend to include in the DCO application.
Development Consent Order	This is the means of obtaining permission for developments categorised as Nationally Significant Infrastructure Projects, under the Planning Act 2008.
DCO application	An application for consent to undertake a Nationally Significant Infrastructure Project (NSIP) is made to the Planning Inspectorate who will consider the application and make a recommendation to the Secretary of State, who will decide on whether development consent should be granted for the DCO Project ² .
DCO Project	The development that is subject to the DCO application, as described in Chapter 3: The DCO Project .
EIA Regulations	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.
Landside	The areas of the airport which do not require full security screening to gain access.

¹ Airports Commission, Airports Commission: Final Report, para 1.1, July 2015

² Planning Act 2008: Development Consent Order Fact Sheet

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/372440/Fact_Sheet_Planning_Act_2008_DCO_Final.docx (accessed 11 May 2018)



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Term	Definition
Made ground	Areas where the ground is known to have been deposited by man on the former, natural ground surface: road, rail, reservoir and screening embankments; flood defenses; soil (waste) heaps; coastal reclamation fill; offshore dumping grounds; construction fill (land raise) ³ .
Scheme	The wider Heathrow Expansion scheme including the DCO Project and other development resulting directly from the DCO Project which is consented outside of the DCO.
Scoping Report	Supports a request by Heathrow for a written Scoping Opinion from the Secretary of State, administered by the Planning Inspectorate (PINS) on behalf of the Secretary of State, to inform the Environmental Impact Assessment (EIA) for the DCO Project.
Throughput	The number of passengers handled in a given time period.

Table 20.2 Abbreviations used in this Scoping Report

Term	Definition
A-CDM	Airport Collaborative Decision Making
ACP	Airspace Change Process
AEP	Annual Exceedance Probability
AIP	Aeronautical Information Package
ALARP	As Low As Reasonably Practical
ALC	Agricultural Land Classification
ALGG	All London Green Grid
AMI	Acute myocardial infarction
ANO	Air Navigation Order
AoDM	Area of Detailed Modelling
AoS	Appraisal of Sustainability
APA	Archaeological protection area
APF	Aviation Policy Framework
APIS	Air Pollution Information System
APU	Auxiliary Power Unit

³ McMillan, A.A and Powell, J.H., British Geological Survey Rock Classification Scheme Volume 4: BGS Classification of artificial (man-made) ground and natural superficial deposits – applications to geological maps and datasets in the UK, p.5, 1999



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Term	Definition
AQAL	Air Quality Assessment Level
AQEG	Air Quality Expert Group
AQMA	Air Quality Management Area
AQO	Air Quality Objectives
ASR	Annual Status Report
ATET	Around the End Taxiway
ATM	Air Transport Movement
AURN	DEFRA's Automatic Urban and Rural Network
AWB	Artificial Water Body
AWP	Aggregate Working Parties
BGL	Below Ground Level
BGS	British Geological Survey
BMV	Best and Most Versatile
BoCC	Birds of Conservation Concern
BPM	Best Practicable Means
C₆H₆	Benzene
CAA	Civil Aviation Authority
CAZ	Clean Air Zone
CCC	Committee on Climate Change
CCG	Clinical Commissioning Group
CCR	Climate Change Resilience
CCRA	Climate Change Resilience Assessment
CDM	Collaborative Decision Making
CERC	Cambridge Environmental Research Consultants
CICTT	Commercial Aviation Safety Team and ICAO's Common Taxonomy Team
CMIP5	Coupled Model Intercomparison Project Phase 5
CO	Carbon Monoxide
CO₂	Carbon Dioxide
CO₂e	Carbon Dioxide Equivalent



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Term	Definition
CoCP	Code of Construction Practice
COMAH	Control of Major Accident Hazards
COMEAP	Committee on Medical Effects of Air Pollution
CORSIA	Carbon Offsetting Reduction Scheme for International Aviation
COSHH	Control of Substances Hazardous to Health Regulations
CPRE	Campaign for the Protection of Rural England
CPZ	Compulsory Purchase Zone
CSM	Conceptual Site Model
CTA	Central Terminal Area
dB	A measure of sound pressure level in decibels, as specified BS EN 61672-2:2003 Electroacoustics. Sound level meter.
Defra	Department for Environment, Food and Rural Affairs
DCO	Development Consent Order
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DPD	Development Plan Document
DSM	Digital Surface Model
EASA	European Aviation Safety Agency
EcIA	Ecological Impact Assessment
EEA	European Environment Agency
EFPS	Electronic Flight Progress Strip
EIA	Environmental Impact Assessment
EMEP	European Monitoring and Evaluation Programme
EPS	European Protected Species
EPUK	Environmental Protection UK
EqIA	Equality Impact Assessment
ES	Environmental Statement
ETS	Emissions Trading Scheme
EU	European Union
FEP	Farm Environment Plan



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EIA Scoping Report – Chapter 20: Glossary

Term	Definition
FEGP	Fixed Electrical Ground Power
FRA	Flood Risk Assessment
FSO	The Regulatory Reform (Fire Safety) Order 2005
GCM	Global Climate Models
GHG Protocol	Greenhouse Gas Protocol Corporate Accounting and Reporting Standard
GIS	Geographic Information System
GLAAS	Greater London Archaeology Advisory Service
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GSE	Ground Support Equipment
GWSA	The full lateral extent of the Lower Thames Gravels WFD groundwater body.
HA	Highways Agency
HAA	Historic Area Assessment
HAL	Heathrow Airport Limited
HCEB	Heathrow Community Engagement Board
HER	Historic Environment Record
HGV	Heavy Goods Vehicle
HHOpCo	Heathrow Hydrant Operating Company
HIA	Health Impact Assessment
HLC	Historic Landscape Characterisation
HMWB	Heavily Modified Water Body
HPI	Habitat of Principal Importance
HRA	Habitats Regulations Assessment
HSC	Hazardous Substances Consent
HSE	Health and Safety Executive
HSPG	Heathrow Strategic Planning Group
IAN	Interim Advice Note
IAQM	Institute of Air Quality Management
ICAO	International Civil Aviation Organisation
ICCI	In-combination Climate Change Impact
IDA	International Dark Sky Association



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Term	Definition
IEA	Institute of Environmental Assessment
IEMA	Institute of Environmental Management and Assessment
ILP	Institution of Lighting Professionals
IPCC	Intergovernmental panel on climate change
IROPI	Imperative Reasons of Overriding Public Interest
IRVI	Instrumented Runway Visual Range
IVRI	Instrumented Runway Visual Range
JHWS	Joint Health and Wellbeing Strategies
JNCC	Joint Nature Conservation Committee
JSNA	Joint Strategic Needs Assessment
kg	Kilogram
km	Kilometre
LAA	Local Aggregates Assessment
LAQM	Local Air Quality Management
LFD	Landfill Directive
LGV	Large Goods Vehicles
LI	Landscape Institute
LIGS	Local Important Geological Sites
LLFA	Lead Local Flood Authority
LNR	Local Nature Reserve
LOAEL	Lowest Observed Adverse Effect level
LOLER	Lifting Operations and Lifting Equipment Regulations
LOOCV	Leave-One-Out Cross-Validation
LpAeqT	Equivalent Continuous Sound Level
LPA	Local Planning Authority
LRTAP	Long-Range Transboundary Air Pollution
LSA	Local Surface Water Study Area
LSE	Likely Significant Effects
LTO	Landing and take-off
LVIA	Landscape and Visual Impact Assessment



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EIA Scoping Report – Chapter 20: Glossary

Term	Definition
LWS	Local Wildlife Site
MA&Ds	Major Accidents and Disasters
M-O	Monin-Obukhov
MPA	Minerals Planning Authority
MtCO₂e	Metric Tons of Carbon Dioxide Equivalent
NAEI	National Atmospheric Emissions Inventory
NAPIA	Noise Action Plan Important Area
NATS	National Air Traffic Services
NBS	Biological Notification Site
NCA	National Character Area
NERG	Noise Expert Review Group
NHLE	National Heritage List for England
NNR	National Nature Reserve
NO	Nitrogen Oxide
NO₂	Nitrogen Dioxide
NOEL	No Observed Effect Level
NO_x	Nitrogen Oxides
NPPF	National Planning Policy Framework
NPSE	Noise Policy Statement for England
NSIP	Nationally Significant Infrastructure Project
NTK	Noise and Track-Keeping
NVC	National Vegetation Classification
NVMP	Noise and Vibration Management Plan
NWR	North West Runway
O₃	Ozone
OPAS	Operational Planning and Scheduling
OSA	Open Space Assessment
Pb	Lead
PCM	Pollution Climate Mapping
PFRA	Preliminary Flood Risk Assessment



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EIA Scoping Report – Chapter 20: Glossary

Term	Definition
PHA	Port Health Authority
PIC	Personal Injury Collision
PHE	Public Health England
PEIR	Preliminary Environmental Information Report
PINS	Planning Inspectorate
PM	Particulate Matter
PPGN	Planning Practice Guidance Noise
PPV mm/s	Peak Particle Velocity Millimetres per Second
ProCliPs	Probabilistic Climate Profiles
PRoW	Public Rights of Way
pSAC	Possible Special Area of Conservation
pSPA	Possible Special Protection Area
PSDH	Project for the Sustainable Development of Heathrow
QRA	Quantitative Risk Assessment
RBD	River Basin Districts
RBMP	River Basin Management Plan
RCM	Regional Climate Model
RCP	Representative Concentration Pathways
RCS	River Corridor Survey
RDB	Red Data Books
revised draft ANPS	Revised draft Airports National Policy Statement
RHS	River Habitat Survey
RIGS	Regionally Important Geological and Geomorphological Sites
RIVP	Remediation Implementation and Verification Plan
RMSE	Root-Mean-Square Error
ROA	Remediation Options Appraisal
RoFMA	Rest of Fully Modelled Area
RRTM	Regional Road Traffic Model
RSPB	Royal Society for the Protection of Birds



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EIA Scoping Report – Chapter 20: Glossary

Term	Definition
SAC	Special Area of Conservation
SAS	Surface Access Strategy
SCI	Site of Community Importance
SeMS	Security Management System
SINC	Site of Importance for Nature Conservation
SM	Scheduled Monument
SMS	Safety Management Systems
SNCI	Site of Nature Conservation
SO₂	Sulphur Dioxide
SOAEL	Significant Observed Adverse Effect Level
SPA	Special Protection Area
SPI	Species of Principal Importance
S-P-R	Source-Pathway-Receptor
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
T5	Terminal 5
TA	Transport Assessment
TAAM	Total Airspace and Airport Modeller
TfL	Transport for London
TRL	Transport Research Laboratory
UAEL	Unacceptable Adverse Effect Level
UHI	Urban Heat Island
UKCP09	UK Climate Projections 2009
UKCP18	UK Climate Projections 2018
ULEV	Ultra Low Emissions Vehicle
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	The United Nations Office of Disaster Risk Management
UXB	Unexploded Bomb
UXO	Unexploded Ordnance



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EIA Scoping Report – Chapter 20: Glossary

Term	Definition
VDV	Vibration Dose Value
VOC	Volatile Organic Compound
WFD	Water Framework Directive
WHO	World Health Organisation
WPO	Wider Property Offer
WSA	Wider Surface Water Study Area
WWTW	Waste Water Treatment Works
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility