



# **Airports Commission:** Appraisal Framework Consultation

January 2014

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# About the consultation

## How to respond

The consultation period began on 16 January 2014 and will run until 28 February 2014. Please ensure that your response reaches us before the closing date.

Please send consultation responses, with a suggested maximum length of 30 pages, to [appraisal.framework@airports.gsi.gov.uk](mailto:appraisal.framework@airports.gsi.gov.uk). A list of consultation questions is included at Appendix C.

When responding, please state whether you are responding as an individual or representing the views of an organisation. If responding on behalf of a larger organisation, please make it clear who the organisation represents and, where applicable, how the views of members were assembled.

## What will happen next

A summary of responses will be published within three months of the consultation closing. A final version of the Commission's Appraisal Framework will be published further to consideration of consultation responses.

# 1. Introduction

**1.1** The Commission published its *Interim Report* on 17 December 2013, including a short-list of three plausible options for increasing long-term capacity. The Commission's work now enters a new phase.

**1.2** The Commission's Terms of Reference set out the following requirements for its Final Report:

**1.3** *The Commission should report no later than summer 2015 on:*

- *its assessment of the options for meeting the UK's international connectivity needs, including their economic, social and environmental impact;*
- *its recommendation(s) for the optimum approach to meeting any needs; and*
- *its recommendation(s) for ensuring that any needs are met as expeditiously as practicable within the required timescale.*

*The Commission should base the recommendations in its final report on a detailed consideration of the case for each of the credible options. This should include the development or examination of detailed business cases and environmental assessments for each option, as well as consideration of their operational, commercial and technical viability.*

**1.4** To understand better the economic, social and environmental impact of the short-listed options, as well as their operational and commercial viability, the Commission will now subject them to a more detailed, wider-ranging and comprehensive analysis than occurred in Phase 1. The results of this analysis will be put to national consultation in autumn of this year and, ultimately, will be published alongside the recommendations in the Commission's final report to the Government.

**1.5** The Commission's intention is that, as well as informing its recommendations, these outputs can be used by the Government as a strong evidential base to support the delivery of its final recommendation, should Government choose to take this forward, for example as materials in the preparation of a National Policy Statement or Hybrid Bill, and/or to accelerate the resolution of any future planning application(s) by scheme promoters. Any decisions about national policy will ultimately be for the Government.

- 1.6** This draft Appraisal Framework sets out in detail how the Commission expects scheme designs to be developed, and how the schemes will be appraised. The framework incorporates four inter-related elements:
- the **Commission's objectives**, against which options will be assessed and on which its final recommendations will be based;
  - an **updated scheme design** for each short-listed option, to be used as the starting point for appraisal;
  - a **business case** and **sustainability assessment** for each option, incorporating the information needed to make informed assessments against the Commission's objectives; and
  - a set of **appraisal modules** explaining the methodologies that the Commission proposes to use in assessing options.
- 1.7** Each of these is described in more detail in this document, and the Commission welcomes views on its suggested approach in each case (whilst noting that the requirement to develop business cases and sustainability assessments for each option is prescribed by its terms of reference).
- 1.8** In constructing this framework the Commission has been mindful of the need to ensure a fair and comparable assessment of all short-listed schemes.
- 1.9** In its *Interim Report*, the Commission also committed to taking forward further studies on the Thames Estuary to understand fully the impacts of a scheme of such magnitude. The Commission has published a separate note alongside this Appraisal Framework setting out its early views on the proposed studies and calling for evidence on the specific areas being taken forward for further work.
- 1.10** As set out in this note, the Estuary research will run as a separate process to the appraisal of the short-listed options. A decision will be made in the second half of the year as to whether an Estuary scheme is a credible option and, therefore, whether or not it progresses to follow the Appraisal Framework proposed in this document in line with the other short-listed options. Further details can be found in the accompanying note.

## 2. Process overview

- 2.1** In Phase 2 scheme promoters should take the lead role in designing and developing their schemes. The Commission will work with scheme promoters to ensure their schemes contain all the evidence necessary to undertake a fair and comparable assessments.
- 2.2** The Commission will appraise schemes in line with the guidance set out in the final version of its Appraisal Framework.
- 2.3** This draft Appraisal Framework has been based on the principles that were used for the identification of viable long-term options for delivering new capacity ahead of the Commission's *Interim Report*.<sup>1</sup>
- 2.4** The Commission's proposed approach is based, therefore, on the same sift criteria categories used in assessing long-term options in the first phase of its work. These categories are:
- strategic fit;
  - economy;
  - surface access;
  - environment;
  - people;
  - cost;
  - operational viability; and
  - delivery.

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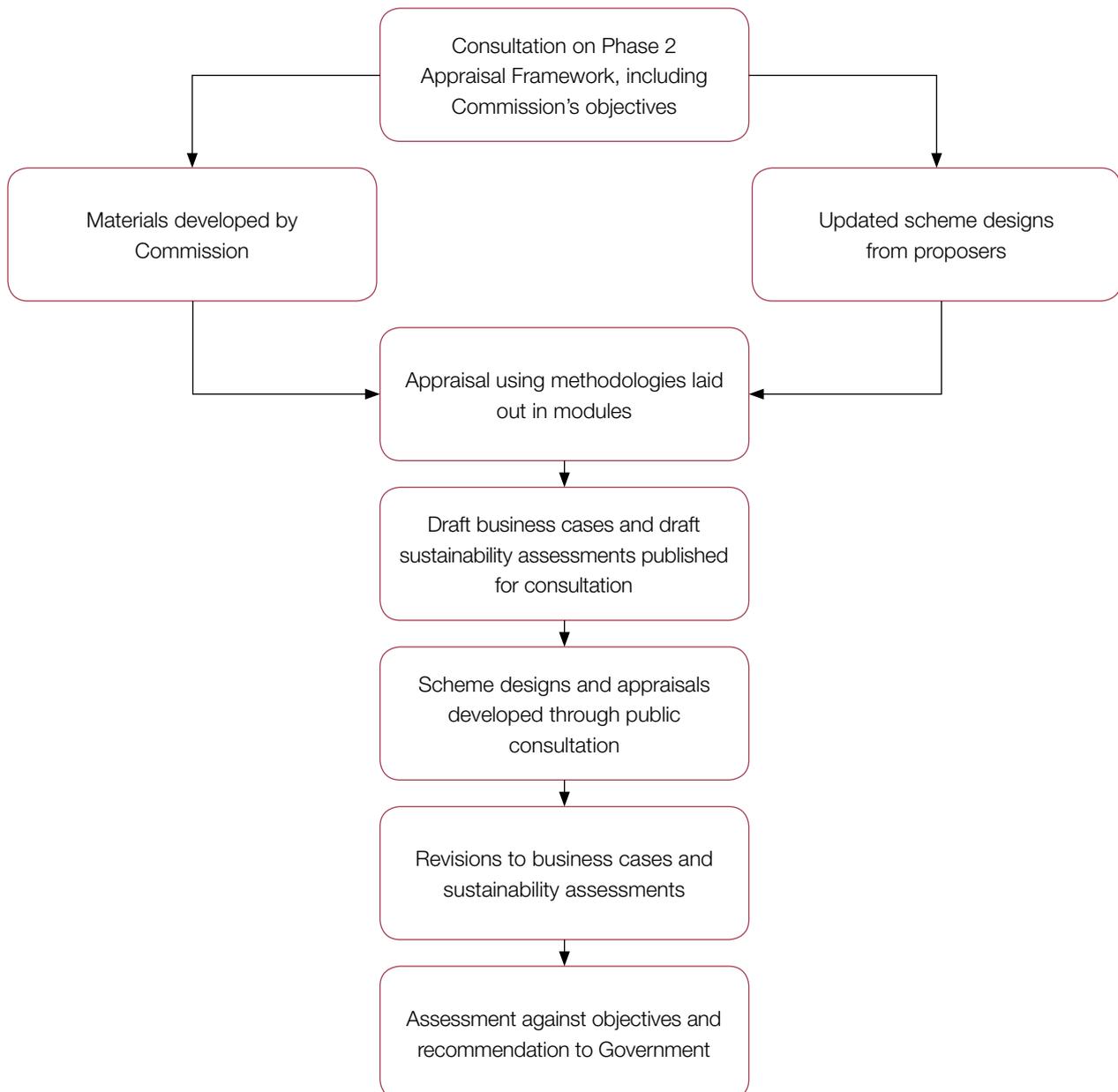
1

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/193867/sift-criteria.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193867/sift-criteria.pdf)

- 2.5** As the basis for reaching the recommendations in its final report, the Commission has identified a number of objectives within each category against which it intends to assess the merits of proposals. These are described in Chapter 3 of this document. The Commission recognises that, in developing and appraising schemes, there may need to be a degree of trade-off between these objectives.
- 2.6** The first stage in assessing the short-listed options against these objectives will be the development of updated scheme designs. Chapter 4 of this document outlines the information that the Commission intends to ask scheme promoters to provide.
- 2.7** The proposed methodologies to be used in appraising the updated design of each short-listed option against the Commission's objectives are described in the draft appraisal modules in Appendix A of this document.
- 2.8** The Commission will use the outputs of its appraisals to compile a business case and sustainability assessment for each proposal. The Commission's intended approach is described in Chapter 5 of this document. The intention is that the business case and sustainability assessment should capture the information needed to assess a scheme against the objectives proposed. They will also ensure that the Commission has access to an integrated value for money assessment and materials of the kind that would underpin any future Strategic Environmental Assessment.
- 2.9** The compilation of business cases and sustainability assessments will also help to ensure that the Commission's recommendations can be easily considered and, if appropriate, adopted by Government.
- 2.10** The overall process is shown in Figure 2.1.
- 2.11** This draft framework is being published for consultation. A list of consultation questions is provided at Appendix C. The Commission welcomes comments from all stakeholders on all elements of this Appraisal Framework by Friday 28 February. A revised, final version of the Appraisal Framework will be published in early spring 2014. Scheme promoters will be asked to submit an updated design of their scheme to the Commission roughly six weeks later.

**2.12** The Commission requests that submissions on this Appraisal Framework, no more than 30 pages long, are made electronically to [appraisal.framework@airports.gsi.gov.uk](mailto:appraisal.framework@airports.gsi.gov.uk). All submissions received will be acknowledged. In line with the Commission's commitment to transparency, all substantive, technical responses will be published on the Commission's website. Please note that the page limit is specific to submissions on the content and structure of the Appraisal Framework. The Commission does not intend to set a page limit for the updated scheme designs submitted by proposers.

**Figure 2.1: Overview of Phase 2 process**



## 3. Commission objectives

- 3.1** The Commission's objectives for proposals in Phase 2 represent an evolution of the sift criteria used in the first phase of the Commission's work programme. The Commission has further refined its ambitions for proposals since Phase 1 to better suit the nature of the task it faces in the second phase of its work.
- 3.2** The Commission has chosen objectives which it believes will enhance the economic, environmental and social benefits of all schemes, whilst reducing their disbenefits. The objectives conform to the principles of mitigating and adapting to climate change and achieving good design, and they should ensure that schemes balance national, local and commercial interests. At all stages, the Commission hopes that the objectives prompt scheme promoters to demonstrate innovation across all aspects of airport and runway design, management and delivery as part of a wider socio-economic-environmental system.
- 3.3** The Commission's understanding of how proposals perform against these objectives will be informed by the appraisals it will carry out, as described in Appendix A of this document. The Commission recognises that it is unlikely that proposals will meet each objective to an equal degree and that an element of 'trade off' between objectives might therefore be required.
- 3.4** Table 3.1 sets out the Commission's proposed objectives, and displays how each objective corresponds to an appraisal module located in Appendix A. Further explanation of each objective is provided in the corresponding module.

**Table 3.1: Commission’s objectives for airport proposals**

Phase 1 sift criteria categories	Phase 2 objective	Phase 2 appraisal module
Strategic Fit	To provide additional capacity and connectivity in line with the assessment of need.	Strategic Fit
	To improve the experience of passengers and other users of aviation.	
Economy	To maximise wider economic benefits and support the competitiveness of the UK economy.	Economy Impacts
	To promote employment and economic growth in the local area and surrounding region.	Local Economy Impacts
Surface Access	To maximise the number of travellers arriving at the airport on public transport, or promote green modes of transport.	Surface Access
	To accommodate the needs of other users of transport networks, such as commuters, intercity travellers and freight.	
	To enable access to the airport from a wide catchment area.	
Environment	To minimise noise impacts.	Noise
	To protect local air quality.	Air Quality
	To protect natural habitats and maintain biodiversity.	Biodiversity
	To minimise carbon emissions in airport construction and operation.	Carbon
	To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk.	Water and Flood Risk
	To minimise impacts on existing landscape character and heritage assets.	Place
	To identify and mitigate any other significant environmental impacts.	To be defined

Phase 1 sift criteria categories	Phase 2 objective	Phase 2 appraisal module
People	To maintain and where possible improve the quality of life for local residents and the wider population.	Quality of Life
	To manage and reduce the effects of housing loss on local communities.	Community
	To reduce or avoid disproportionate impacts on any social group.	
Cost	To make efficient use of public funds, where they are required, and ensure that the benefits of schemes clearly outweigh the costs, taking account of social, environmental and economic costs and benefits.	To be assessed in the business case
Delivery	To be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users.	Cost and Commercial Viability
	To have the equivalent overall capacity of one new runway operational by 2030.	Delivery
	To actively engage local groups in scheme progression, design and management.	
Operational Viability	To enhance individual airport and airports system resilience.	Operational Risk
	To ensure individual airport and airports system efficiency.	Operational Efficiency
	To build flexibility into scheme designs.	
	To meet industry safety and security standards.	

## 4. Updated scheme design

- 4.1** In order to maximise the value of the Commission’s autumn public consultation and inform its final recommendations, short-listed schemes should be developed to a broadly equivalent level, to enable appraisal to a consistent standard.
- 4.2** To this end, the Commission invites scheme promoters to submit an updated scheme design. This updated design will be a development of the specific option short-listed by the Commission.
- 4.3** The Commission would encourage promoters to seek creative and innovative means of meeting its objectives. Given the long timescales for delivering and operating any new infrastructure there is likely to be significant development in technology, operational practice and the regulatory environment with regard to both the aviation industry and the wider user community. Promoters should therefore give consideration to future technologies and practices that may affect their scheme and its performance in relation to the objectives. It is important for the Commission to know ‘what is new’ about each scheme, especially in relation to global best practice or state of the art design.
- 4.4** Scheme promoters may find it helpful to present their updated scheme designs in terms of the following elements, which should provide the flexibility to address all of the objectives:
- **Strategic Argument**, outlining why a proposal is well placed to address the UK’s future aviation capacity and connectivity needs, and how it may support the socio-economic development of local areas, regions and the UK as a whole;
  - **Airport Master Plan**, providing details of the airfield design and its planned modes of operation, including planned airspace requirements;
  - **Engineering Plans**, comprising information on costings, energy and utilities requirements, geo-environmental issues and surface development plans;
  - **Mitigation Strategies**, comprising plans to limit detrimental and enhance positive impacts on the environment and local communities; and
  - **Development Strategies**, detailing how the additional capacity would be funded and project-managed to delivery.

- 4.5** In respect of surface transport, scheme promoters will be invited to submit details of proposed **Surface Access Strategies**. However, this will be used as an input into an overall programme of work led by the Commission. This is because any surface access improvements to support proposed new airport infrastructure are likely to be at least part-funded by the Government, and the design and appraisal of appropriate surface access measures will require the full involvement of Network Rail and the Highways Agency amongst others. For instance, the Commission will have to give consideration to how the surface transport elements of proposals would align with wider transport investment strategies. The commission is well-positioned to undertake this work.
- 4.6** Further detail on the material requested by the Commission and how it might be captured in the elements suggested above is provided in Appendix B. The relationship between the Commission's suggested objectives, suggested elements of updated scheme designs and the appraisal modules is set out in Table 4.1. The table is intended as an indicative guide only. Scheme promoters need not address objectives in, or solely in, the areas of updated scheme designs indicated. Equally promoters need not address all objectives, however, the Commission will; and the updated design is the promoters' opportunity to set out their views.
- 4.7** The Commission recognises that preparing an updated scheme design may be a substantial undertaking. Where scheme promoters believe that their submissions to the Commission during Phase 1 of its work have already given sufficient coverage to a particular issue, they may wish to re-use that material as part of their submission. The Commission will endeavour to ensure that the preparation of updated scheme designs is a manageable process, and will put in place a working protocol between the Commission Secretariat and scheme promoters to this end.
- 4.8** Once updated scheme designs have been submitted, the Commission will review whether further refinements to scheme proposals are required or would be beneficial. It is reasonable to expect schemes to develop and change in response to the results of their appraisal and the Commission will keep under review how its assessments and public consultations can best reflect this iterative process.
- 4.9** Updated scheme designs will be used as the basis for appraisal, although the Commission may supplement or amend these with additional information where necessary. The Commission will use the appraisal modules outlined in the final version of this document to carry out an assessment of how each proposal performs against its objectives.

**Table 4.1: Relationship between the Commission's suggested objectives, elements of updated scheme designs and the appraisal modules**

Phase 1 Sift Criteria Categories	Phase 2 Objectives	Updated scheme design element						Assessment Modules
		Strategic Argument	Airport Master Plan	Engineering Plans	Mitigation Strategies	Development Strategies	Surface Access Strategies	
Strategic Fit	To provide additional capacity and connectivity in line with the assessment of need.							Strategic Fit
	To improve the experience of passengers and other users of aviation.							
	To maximise wider economic benefits and support the competitiveness of the UK economy.							
Economy	To promote employment and economic growth in the local area and surrounding region.							Economy Impacts
	To maximise number of travellers arriving at the airport on public transport, or promote green modes of transport.							Local Economy Impacts
Surface Access	To accommodate the needs of other users of transport networks, such as commuters, intercity travellers and freight.							Surface Access
	To enable access to the airport from a wide catchment area.							
Environment	To minimise noise impacts.							Noise
	To protect local air quality.							Air Quality
	To protect natural habitats and maintain biodiversity.							Biodiversity
	To minimise carbon emissions in airport construction and operation.							Carbon
	To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk.							Water and Flood Risk
	To minimise impacts on existing landscape character and heritage assets.							Place
	To identify and mitigate any other significant environmental impacts.							To be defined
People	To maintain and where possible improve the quality of life for local residents and the wider population.							Quality of Life
	To manage and reduce the effects of housing loss on local communities.							Community
Cost	To reduce or avoid disproportionate impacts on any social group.							To be assessed in the business case
	To make efficient use of public funds, where they are required, and ensure that the benefits of schemes clearly outweigh the costs, taking account of social, environmental and economic costs and benefits.							
Delivery	To be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users.							Cost and Commercial Viability
	To have the equivalent overall capacity of one new runway operational by 2030.							Delivery
	To actively engage local groups in scheme progression, design and management.							
Operational Viability	To enhance individual airport and airports system resilience.							Operational Risk
	To ensure individual airport and airports system efficiency.							Operational Efficiency
	To build flexibility into scheme designs.							
	To meet industry safety and security standards.							

## Alternative designs and additional mitigations

- 4.10** The Commission does not intend, as part of its Phase 2 work, to investigate any airport proposals other than the three schemes shortlisted in its *Interim Report* and, should its work on a Thames Estuary option lead it to the conclusion that a credible scheme may exist there, a scheme at that location.
- 4.11** However, the Commission is conscious that, within the proposals shortlisted in its *Interim Report*, there is the scope for some variation around particular elements of the proposal. Examples here might include, but not be limited to, the configuration of stands or terminal buildings, the routing of arriving or departing aircraft in the vicinity of the proposal or elements of the surface access packages associated with proposals. The Commission will identify and assess a central scheme design with the scheme proposer. It is possible, however, that in the process of updating their scheme promoters will identify alternative designs or mitigations which have the potential to enhance a scheme, but which do not make their way into a scheme's central case.
- 4.12** The Commission will need to understand these alternative options and to consider them as part of its assessment. As such, the Commission invites scheme promoters to identify clearly alternative design plans and mitigation strategies to the Commission as part of their submissions in May. These alternatives may form part of the Commission's national consultation.

## 5. Scheme appraisal

- 5.1** The methodologies that the Commission intends to use in assessing short-listed options against its objectives are described in the draft appraisal modules in Appendix A of this document.
- 5.2** The appraisal modules are intended to enable the Commission to assess short-listed options against all of the key areas of interest relevant to its objectives. However, the Commission may nonetheless identify additional information or areas of analysis in the course of its work that it considers necessary to inform its final recommendations. In such circumstances, the Commission will ensure it takes a consistent approach for all short-listed schemes.
- 5.3** In constructing the methodologies set out in the appraisal modules, the Commission has been guided by its Sustainability Reference Group (an advisory body comprising relevant Government departments, the Environment Agency, Natural England and English Heritage) and by members of its expert advisory panel. In addition the Commission has reviewed, where appropriate, advice submitted by stakeholders on the Commission's Phase 1 sift criteria.
- 5.4** In many areas the Commission's Appraisal Framework draws upon transport and wider appraisal guidance issued by Government, such as DfT's WebTAG or HM Treasury's Green Book. In constructing appraisals on the sustainability of proposed schemes, the Commission has drawn on prior practice in this area.
- 5.5** In some areas, however, the Commission has outlined appraisal approaches which it thinks will, alongside standard methodologies, help it capture and understand the impacts of delivering major new aviation infrastructure. These approaches include methodologies for considering national and local economic impacts, noise impacts and quality of life impacts of proposed schemes. In addition, the Commission is keen to consider impacts, where possible, across the full lifetime of a scheme, taking into account a range of possibilities for how the aviation industry and other relevant variables may develop over time. This will require the complex assessment of dynamic and uncertain future scenarios.

- 5.6** The Commission's decisions will continue to be informed by the principles of strategic environmental assessment, such that at the point of any future decision the Government will have access to a body of environmental information that could inform policy development. This will include both the materials already produced in support of the Commission's *Interim Report* and the appraisal materials prepared in this phase of the Commission's work programme.
- 5.7** The Commission will take the lead in appraising the updated scheme designs submitted by promoters. Since effective scheme design will need to be based on an appropriate understanding of the potential impacts of the proposal, however, scheme promoters may carry out appraisals of their own to inform their design work. The Commission will consider any such timely appraisal information submitted by proposers. However, the final responsibility for all scheme appraisals will lie with the Commission.
- 5.8** Scheme promoters will benefit from working closely with the Commission to ensure they are pursuing any assessments in line with the methodologies outlined in this document.

## Business cases and sustainability assessments

- 5.9** In line with its terms of reference, the Commission intends to use the outputs of its appraisals to compile a business case and a sustainability assessment for each short-listed option. It is intended that these will incorporate the full range of information needed to assess proposals against the Commission's objectives.
- 5.10** These documents serve different purposes. A business case provides the Commission with an integrated assessment of the overall case for a proposal taking into account strategic, economic, environmental and other factors. In order to be able to understand the performance of one proposal against another, their relative performance is assessed against a consistent 'do-minimum' case. A business case also includes assessments of the affordability and deliverability of the proposal to ensure that these factors are taken into account in decision-making.
- 5.11** As with the business case, the Commission's sustainability assessment will also plot scheme performance against a baseline (the projected sustainability trends in the absence of new developments) with the aim of ensuring that the members of the Commission have information available in respect of each of a range of sustainability indicators, rather than seeking to produce an integrated assessment. It will assess performance against specific benchmarks, as well as considering the relative performance of options against a 'do-minimum' case.

- 5.12** For example, a business case may identify that an airport scheme under development will improve air quality in a region compared to a 'do-minimum' case and would take this into account in assessing the value for money of the proposal. A sustainability assessment may add the further context that the air quality mitigations proposed also ensure the scheme is able to meet legislated targets or benchmarks, as well as improving the status quo. Conducting the two appraisals in tandem allows a more rounded assessment picture to be constructed.
- 5.13** There is a large degree of overlap between business case and sustainability assessment. Typically the two assessments require the collection of very similar or identical data, but use this data in different ways. Because of this large degree of overlap, the Commission's Appraisal Framework describes the methodologies for both business case and sustainability assessments within the same modules. For example, how noise impacts will be treated in a business case, and the methodology for conducting a sustainability assessment on noise impacts, are explained in the same 'Noise' module.
- 5.14** Not every assessment topic is relevant to the construction of a business case, and not every assessment topic requires a sustainability assessment be undertaken. Each appraisal module marks clearly, at the start of the module, which of these two types of assessment the module is relevant to.

## Business case

- 5.15** In preparing business cases for the short-listed options, the Commission intends to follow the broad approach set out in the Government's guidance on preparing business cases for transport projects. This will ensure that the Commission's recommendations take into consideration the factors of relevance to any future Government decision and, as a result, will reduce the risks of delay to delivery.
- 5.16** As such, each business case will comprise five elements:
- Strategic Case – assessing the proposal's alignment with the assessment of need set out in the Commission's *Interim Report*, and providing an overview of its wider impacts, both positive and negative.
  - Economic Case – assessing the value for money of the proposal, taking into account the full range of potential costs and benefits (including non-monetised as well as monetised impacts).
  - Commercial Case – assessing the commercial deliverability of the proposal, including analysis of the options for and potential scale of any public sector contribution.
  - Financial Case – assessing the overall financial cost and sources of funding for the proposal, particularly in respect of any public expenditure.

- Management Case – assessing the overall achievability of the proposal, including its engineering and operational viability, and the risks associated with this.

**5.17** In respect of the economic case, each short-listed option will be assessed against the same ‘do-minimum’ demand forecast, which establishes what would happen if no new long-term capacity infrastructure is developed. This option will be developed using a version of the DfT aviation forecasting model, which was extensively updated by the Commission in Phase 1 in response to comments to its *Demand Forecasting* discussion paper and other inputs.<sup>2</sup> A full explanation of recent changes to the model was published in *Appendix 3: Technical Appendix to the Interim Report*<sup>3</sup>.

**5.18** The development of the ‘do-minimum’ baseline will incorporate all short-term recommendations made by the Commission in Phase 1.

**5.19** Additional ‘do-minimum’ scenarios may be constructed to enable the Commission to test proposals against a range of alternative futures in the aviation industry and wider economy.

**5.20** In most instances, business case appraisal will appraise the benefits and disbenefits of schemes for a period of 60 years from construction commencing on the scheme. In practice modelling impacts so far into the future will be difficult, often due to the shorter time-horizons for datasets which will be used to inform the Commission’s analysis (for example future vehicle fleet projections, important for modelling noise and air quality impacts, only run to the 2030s). Where projections are particularly prone to uncertainty the Commission will endeavour to apply logic and best-practice guidance to defining benefits and disbenefits and to feeding these into its wider appraisal.

## Sustainability assessment

**5.21** The aim of the Commission’s sustainability assessment is to provide robust information about the performance of each proposal against a range of relevant indicators. In line with the principles of sustainable development, this includes examining the likely social, environmental and economic effects of the short-listed proposals. Where potential significant adverse effects are identified, the sustainability assessment is intended to review and take account of options for avoiding or mitigating these. The process also allows for the identification of opportunities to undertake social, economic and environmental enhancement.

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2 <https://www.gov.uk/government/publications/discussion-paper-on-aviation-demand-forecasting>

3 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/266670/airports-commission-interim-report-appendix-3.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/266670/airports-commission-interim-report-appendix-3.pdf)

- 5.22** Should the Government use the Commission's recommendations as the basis for a future National Policy Statement, it is intended that the information and analysis in the Commission's sustainability assessment would provide a useful foundation for the production of the associated Appraisal of Sustainability.
- 5.23** As with the economic appraisal in the business case, each sustainability assessment will be undertaken against a baseline. Individual assessment modules articulate how this baseline will be established.
- 5.24** For each module, performance is measured in relation to the baseline, and defined in terms of the following five levels:

**Highly supportive:** positive impacts are substantial, or substantially accelerate an improving trend, or substantially decelerate a declining trend.

**Supportive:** positive impacts are notable, or accelerate an improving trend, or decelerate a declining trend.

**Neutral:** no impacts, or on balance (taking account of positive and negative impacts) a neutral outcome occurs.

**Adverse:** negative impacts are notable, or decelerate an improving trend, or accelerate a declining trend.

**Highly adverse:** negative impacts are substantial, or substantially decelerate an improving trend, or substantially accelerate a declining trend.

- 5.25** The manner in which impacts are measured will not be uniform for every indicator. Rather, assessments will be based on evidence-based analysis and expert judgement. For example, judgement on whether an impact will be 'notable' or 'substantial' may be based on a range of considerations, such as:
- with regard to a feature under consideration:
    - its strategic importance;
    - the intrinsic value;
    - its susceptibility to change; and
    - its uniqueness or replaceability;
  - with regard to the nature of the impact likely to occur:
    - the magnitude of the impact;
    - the probability of the impact occurring;

- the temporal scale of predicted impacts;
- the spatial scale of predicted impacts;
- the duration of the predicted impacts;
- the durability or reversibility of any predicted impacts; and
- cumulative impacts.

**5.26** Given the long-term nature of the impacts being assessed it may be beneficial when presenting assessment results to simplify the outputs by considering scheme performance at the following discrete phases of the scheme: construction phase, initial operations phase, and mature operations phase.

**5.27** Sustainability assessment is not intended to be a means of defining a total scheme impact (for example, through the process of summing predicted impacts), and the Commission will not process its assessment outputs in this manner. Neither will poor performance in one area or a number of areas imply that a scheme is not suitable for progression. Rather, the purpose of the assessment is to provide decision-makers with good information on the predicted impacts of a scheme on all relevant social, economic or environmental factors.

**5.28** The Commission will, however, consider the cumulative impacts of a scheme, in line with the principles of the Strategic Environmental Assessment Directive.

## Consultation questions

**5.29** A list of consultation questions is compiled in Appendix C. Whilst we hope these questions act as useful prompts, the Commission welcomes submissions on all aspects of this framework. Respondents should not feel obliged to engage with the entire framework if they would prefer to focus on particular areas.

# Appendices

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# Appendix A: Appraisal modules

## 1. Strategic fit

Objectives		<b>To provide additional capacity and connectivity in line with the assessment of need;</b> and <b>To improve the experience of passengers and other users of aviation.</b>
Business Case		The assessments outlined in this module will be discussed in the Strategic Case.
Sustainability Assessment	N/A	

### Introduction

- 1.1** The Commission has already undertaken a significant work programme to inform its *Interim Report* on the type of capacity and connectivity which the UK and South East airport system will likely need. The Commission wishes to further this assessment by considering how each proposal can deliver the capacity and connectivity required and offer a better experience to users of aviation.
- 1.2** In light of this the Commission's Strategic Fit assessment will determine whether the proposal:
- (a) fits with the Commission's terms of reference, for example, the contribution it makes to maintaining the UK's status as an international hub;
  - (b) provides UK airport users with future levels of air connectivity commensurate with the Commission's assessment of need, as outlined in the *Interim Report*; and
  - (c) is adaptable to a range of potential future capacity needs which will be determined by the future changes in the aviation industry, such as changes driven by technological developments, changes in global economic outlook or global governance and constantly evolving airline business models.

## Outline

- 1.3** The final output of the Strategic Fit assessment is likely to draw on a number of areas of the Appraisal Framework, along with drawing upon some of the assessment described in this module. The Cost and Commercial Viability, Economy Impacts and Strategic Fit assessments are likely to be developed alongside one another.

## Assessment

### Assessment base case

- 1.4** The proposal will be consistent with the 'do-minimum' scenario detailed in the introduction to the Appraisal Framework and will be assessed against a number of scenarios to account for changes which could occur in the industry and wider economy.

### Assessment detail

- 1.5** The Strategic Fit assessment will propose and assess the likelihood of a range of future behavioural changes for airlines and airline alliances, which will be based on a set of proposal-specific scenarios, additional to those mentioned in the assessment base case. Using these airline and alliance scenarios, the Commission can then do the following:
- assess the level of future aviation demand expected within and surrounding the South East airport system using the DfT aviation demand model;
  - assess the ability of the proposal to support regional connectivity;
  - determine the potential reactions and behaviour of airlines and alliances, including reactions to changes in price and other factors;
  - determine what further scenarios could change the wider aviation industry and economy, and how this might affect the 'do-minimum' case and proposal;
  - assess the competition among airports and airlines, including consideration of current and possible future regulatory regimes; and
  - assess how changing airline behaviour and/or the composition of airport services might affect the aviation user, including price changes, international and regional connectivity and the wider experience on offer.

- 1.6** This work will be underpinned by specific assumptions around plausible future technological, economic and other trends. Scenarios and their underpinning assumptions will be consistent across the assessment of all proposals.
- 1.7** Specific assumptions on airlines' reactions to schemes will, where possible, be evidenced by:
- comparison of reactions of airlines to similar changes (case studies); and
  - airline strategies, if these are available.
- 1.8** The developed scenarios will serve as a base for the assessment of the competitiveness of the aviation market in the Cost and Commercial Viability and Economy Impacts modules.

### **Datasets and modelling**

- 1.9** The following datasets can be used:
- DfT aviation model; and
  - framework for assessment of airline behaviour that may be fed in to the DfT aviation model or be combined with passenger demand forecasts.

### **Outputs of the assessment**

- 1.10** The appraisal will provide an assessment of each behavioural scenario, assessed according to its connectivity outcome. Then the likelihood of each scenario will be assessed in order to arrive at a measure of robustness of the proposal in terms of its future connectivity outcomes and impacts on the passenger.

## 2. Economy impacts

Objective		<b>To maximise wider economic benefits and support the competitiveness of the UK economy.</b>
Business Case		Benefits and costs in relation to the Commission's 'do-minimum' are considered in the Economic Case and Strategic Case, on a monetised basis where possible.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

### Introduction

- 2.1** The impact of aviation capacity and connectivity constraints on the economy has been widely cited in responses to the Commission's *Aviation Connectivity and the Economy* discussion paper,<sup>4</sup> airport proposals and wider aviation and economy literature. It is clear that the relationship between aviation connectivity and economic growth is positive but complex and transmits through the economy in many different ways.
- 2.2** In its *Interim Report*, the Commission undertook an analysis of the potential impacts of aviation capacity constraints on the UK economy. The analysis focused on changes at the aggregate level and no specifics of individual schemes were considered in the analysis. Some impacts were not included in this initial assessment, notably freight industry impacts and the effect of changes to the competitive nature of the aviation market.
- 2.3** The appraisal methodology set out in this framework will be based on a variety of techniques and will provide the Commission with a scheme-specific economy assessment. This will ultimately go into more detail and assess additional factors, such as competition impacts, which were previously omitted.
- 2.4** This module only considers the impacts of a scheme on the economy, not all monetised benefits and disbenefits. Other monetised impacts such as those from environmental factors are covered in other modules and will be the subject of a separate detailed value for money assessment as part of the business case.

<sup>4</sup> <https://www.gov.uk/government/publications/discussion-paper-on-aviation-connectivity-and-the-economy>

**2.5** The Local Economy, Strategic Fit and Cost and Commercial Viability assessments all interlink with this module. As the appraisal process progresses it is likely that some of these assessments will be developed alongside one another to ensure coherence and to prevent double-counting.

## Outline

**2.6** The Phase 2 appraisal of the economy will examine the impacts of a change in aviation connectivity on aviation users and providers, as well as associated direct and wider impacts transmitted through the economy.

**2.7** Impacts on the aviation user and provider will include assessments of:

- how delays in the UK airport system might change;
- how passengers and airports/airlines 'surplus' might alter or be transferred;
- how the aviation market and corresponding competition between airlines and airports is likely to change; and
- what the impact on the air freight industry could be.

**2.8** The connectivity impacts associated with a change in capacity that have a direct and wider impact on the economy will be considered where possible. This will aim to include impacts associated with changes in foreign direct investment (FDI), trade and tourism, and examine how these filter through the economy to affect productivity and other spillovers.

**2.9** A major input to this analysis will come from the Airports Commission's demand forecasts, produced using a version of the DfT aviation model. Given the dynamic and complex nature of the aviation industry and economy the Commission will also be considering a number of alternative scenarios to account for these factors.

## Assessment

### **Assessment base case**

**2.10** The scheme will be consistent with the 'do-minimum' scenario detailed in the introduction to the Appraisal Framework and will be assessed against a number of scenarios to account for changes which could occur in the industry and wider economy.

## Assessment detail

- 2.11** The analysis underpinning the assessment of economy impacts will be based on a set of detailed demand forecasts. This analysis will include a more detailed assessment of demand forecasts used in the *Interim Report*, using both the DfT aviation model and other relevant models, to better understand how users and providers' behaviour might change under different proposals. The economy assessment will also consider how an airport scheme will be affected by and impact on factors currently not considered in the forecasts. Demand modelling cannot capture the full complexities of airline and passenger behaviour, and it is particularly difficult to model a step change in the aviation sector (for example, potential movements of airline alliances) so further analysis will be needed here.
- 2.12** Assessing the wider impacts of additional airport capacity and corresponding changes in aviation connectivity on the economy is a complex task and there are no agreed methodologies on how best to capture all the impacts. In its *Interim Report*, the Commission undertook a number of pieces of research and analysis which were used to form a broad model of how a capacity constraint might transmit through the economy. In Phase 2 this transmission mechanism and the research and analysis already undertaken will be used to assess and value these impacts. The Commission will also consider how this approach could be enhanced by using market segmentation to disaggregate the effect on different passengers and businesses.
- 2.13** The methodology for assessing the impacts of additional capacity on the economy is based broadly on that presented in the *Interim Report* but with a more comprehensive set of impacts included. At this stage, the impacts on the users and providers of aviation are presented separately to impacts on business and the economic environment. In reality the two categories of impact cannot in all cases be considered entirely additional to one another. The Commission's assessment will aim to consider the level of additionality and present impacts appropriately.
- 2.14** Other considerations, such as local economic impacts, surface access, environmental impacts, commercial viability and the strategic case, are covered in other modules in the Appraisal Framework.

## Users and providers of aviation

### *Transport economic efficiency*

- 2.15** This analysis involves estimating the change in congestion premia at UK airports. This method has been used previously to consider the impact of changes in airport capacity and is recommended in DfT guidance on the appraisal of aviation schemes published in WebTAG.<sup>5</sup> This approach is undertaken using outputs from the DfT aviation model, specifically the National Air Passenger Allocation Model (NAPAM), which applies a 'shadow cost' to passengers travelling from a constrained airport. This has the effect of restricting demand at an airport to its capacity. These 'shadow costs' can be used to estimate the value of relieving a capacity constraint.
- 2.16** Comparing the shadow cost of the capacity provided by a proposal and a capacity constrained system allows a comparison of the difference in prices that passengers would hypothetically have to pay under a constrained system at different locations. The Commission aims to supplement this transport economic efficiency analysis, either through developing the existing model or considering alternative approaches, to provide a more detailed and dynamic picture of how providers and users of aviation might be affected. The Commission proposes developing scenarios to understand how the benefits associated with each option may change depending on a range of future patterns of development within the aviation industry. This will be undertaken in conjunction with those developed in the Strategic Fit module.

### *Freight impacts*

- 2.17** In Phase 1 the Commission undertook an assessment of the air freight industry and concluded that freight activity in the UK was commonly led by connectivity offered to passengers via a buoyant 'freight forwarder' market utilising bellyhold capacity in passenger aircraft. It also found that a number of UK airports supported dedicated freight aircraft, which is important to many other industries.
- 2.18** Any changes to the composition of airport capacity could impact upon the freight industry and this is not necessarily picked up adequately in the DfT aviation model, though the Commission will consider previous frameworks for calculating the possible impacts on the air freight industry.

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5 TAG unit 3.18c: Aviation Appraisal, <http://www.dft.gov.uk/webtag/documents/expert/unit3.18c.php>

*Changes to the competitive nature of the aviation market*

- 2.19** The Strategic Fit module in the Appraisal Framework will consider different high level competitive scenarios and the economy assessment will attempt to quantify these impacts.
- 2.20** The airline market is inherently dynamic and changes can occur rapidly. These are very difficult to predict; in the last decade there has been significant growth in the low cost sector and consolidation of the long-haul and network sectors into three main alliances. Many such developments can occur within the lifetime of a runway. There have also been changes to airport ownership and usage, including the recent break-up of BAA Ltd.
- 2.21** The transport economic efficiency modelling mentioned above may not account for impacts associated with step changes in competition among airports or airlines and how this might affect the passenger. Using insight gained from expert panel members, industry experts and tools used in competition assessments, the Commission will assess how a scheme might change the airport and airline market and the competition within it. This will include estimating how each scheme could:
- affect competition among airports and airlines;
  - affect the users and providers of aviation services; and
  - make mitigations or enhancements to optimise any new market structure created.
- 2.22** This will involve developing a picture of how the aviation market is structured and some level of market segment analysis. For example, schemes could provide passengers in different market segments, such as business, leisure and visiting friends and relatives, with very different levels of connectivity. Likewise, a destination level analysis may also be required.
- 2.23** Where this analysis suggests changes in competition could materially affect the economic benefits derived from any option, either positively or negatively, this will be considered in the Commission's assessment.
- 2.24** An analysis of the aviation market will need to be undertaken closely with any commercial assessment, where the issue of airport charges will be considered when drawing up financing options and predicting the balance of impacts for airports, airlines, passengers and the rest of society including Government.

### *Delay impacts*

**2.25** Delays can impact on passengers through two channels:

- tactical/failure delays – delays caused due to an unforeseen event in the air or on the ground, occurring on the day of operation and not accounted for in advance.
- strategic/prevention delays – schedules at airports have slack built in for delays and queuing which occurs on air side operations on a regular basis, so are accounted for in advance.

**2.26** Once an airport reaches maximum capacity its ability to absorb tactical delays into its schedules is reduced significantly. A minor sequence of delays in the early morning (the primary delay) can affect the schedule right at the end of the day (secondary delays), sometimes meaning flights take off in the night quota period. At an unconstrained airport, where demand has peaks and troughs, the schedule has slack within it to absorb primary delays, minimising the likelihood of secondary delays.

**2.27** Tactical delays tend to impact upon the reliability of an airport, which can be disruptive and costly to airports users and its operators, especially when delays affect the schedule later in the day. Over time the airport and airlines begin to build common delays into its schedule, known as strategic delays, which improves the reliability for users and providers but negatively impacts upon travel times, ultimately increasing the generalised cost of travel.

**2.28** In the *Interim Report* initial analysis to estimate the size of this impact was undertaken. This compared a constrained and unconstrained airport system, using the University of Westminster airport resilience study (2008).<sup>6</sup> In Phase 2 the Commission will build on this preliminary analysis to gain a better understanding of the reliability impacts and to build in proposal-specific assumptions.

## **Impacts on other sectors and business and the economic environment**

### *Direct impact on businesses*

**2.29** Any aviation capacity proposal will be likely to impact upon the level of aviation connectivity, which will affect the users of aviation, as detailed previously in this module, and will transmit further through users into the wider economy. The Commission's previous analysis suggests that changes in connectivity have been found to have impacts on the performance of the economy, which was mainly

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<sup>6</sup> European airline delay cost reference values: Final Report Version 3.2 (March 2011), Department of Transport Studies and University of Westminster, London  
<http://www.eurocontrol.int/sites/default/files/content/documents/single-sky/pru/publications/other/european-airline-delay-cost-reference-values-final-report-v3.2.pdf>

focused on trade, foreign direct investment and tourism. Aviation was found to play a crucial role in facilitating the movement of people, goods and services, enabling UK consumers and businesses to interact with the global marketplace quickly across vast distances. For some sectors there is no viable alternative to aviation for connecting consumers and businesses.

- 2.30** The Commission is planning to build on the work it has already undertaken both to understand better how impacts of a change in aviation connectivity transmit through the economy and to understand better how specific schemes might create different outcomes. Further research is likely to be undertaken to a more detailed level, for example segregating markets to better understand how schemes might affect different types of user and routes. Previous analysis was undertaken on an aggregate whole airport system level. As part of this next stage of analysis econometric and general equilibrium modelling may be taken further, including looking at the potential to carry out such assessments on a location-specific basis.

#### *Wider impacts on the economic environment*

- 2.31** The Commission's previous work involved assessing the direct impacts of a capacity constraint on trade, foreign direct investment and tourism and how these can create wider economic impacts e.g. productivity improvements. The Commission has previously undertaken a substantial literature review to investigate the strength and nature of the link between the direct impacts of connectivity and their effects on the wider economy. This looked not only at aviation-specific research but also a broader range of international studies on the impacts of trade, foreign direct investment and tourism in general.
- 2.32** The Commission is planning to build on the work it has already undertaken to better understand how aviation connectivity can impact upon the wider economy. Similarly to the assessment of direct impacts on business, more detailed segmentation analysis or econometric and general equilibrium modelling may be used to assess these impacts.

#### **Outputs of the assessment**

- 2.33** Where possible all impacts on the economy will be monetised, though in some cases a qualitative assessment will be required where the impacts are difficult to quantify.

- 2.34** The outputs of this assessment are likely to span a range of other objectives in the Commission's Appraisal Framework and likewise the overall economic assessment will draw on outputs from other parts of the framework. The outcome of this assessment will be detailed in the Economic and Strategic Cases in the final business case and will be used to assess the stated objective. Under the Economic Case, the Commission will undertake a Value for Money assessment, consistent with the process undertaken by government when considering investment, which will include the impacts assessed in this Economy module along with the monetised impacts detailed in other appraisals, such as those associated with environmental impacts. It is likely that its outputs will also be used to inform the Strategic Fit module and Cost and Commercial Viability appraisal outputs.
- 2.35** The Commission's assessment of economy impacts and any monetised impacts will need to be considered from different perspectives given the complexity of the public and private ownership of the aviation and related transport sectors. For example, some proposals may require aspects to be publically financed or risk guaranteed, and there will be a role for Government in planning any National Policy Statement.

### 3. Local economy impacts

Objective		<b>To promote employment and economic growth in the local area and surrounding region.</b>
Business Case	✓	Benefits and costs in relation to the Commission’s ‘do minimum’ are considered in the Strategic and Economic Case. These impacts will be assessed qualitatively and quantitatively.
Sustainability Assessment	✓	A sustainability assessment will be undertaken against the stated objective.

#### Introduction

- 3.1** Airports play a significant role in the economic life of their nearby communities, both through the direct employment they provide and the potential to attract and agglomerate businesses which depend upon air travel, or proximity to those that do. The responses to the Commission’s sift criteria in Phase 1 highlight the complex and crucial roles that airports play in their local economy and in the wider area. For example, many local authorities have made the Commission aware of their area’s dependency on an airport.
- 3.2** The Commission will examine whether schemes have taken opportunities to maximise the economic benefits for their local areas and potentially the surrounding region, in terms of employment, regeneration and supporting wider economic development strategies.
- 3.3** The spatial scale of the appraisal will vary depending on the scheme. The business corridors, such as the Thames Valley corridor and the Gatwick Diamond area, as well as towns and villages in the local and wider area that could potentially be affected, will be analysed.
- 3.4** The Commission will also look at whether proposals have a viable workforce and skills base to enable them to operate effectively and to maximise local benefits.
- 3.5** This appraisal sets out the Commission’s approach to assessing how an airport development can lead to changes in local businesses, job opportunities, housing and amenities. The Commission will draw on experts in this field to develop and test its analysis.

## Outline

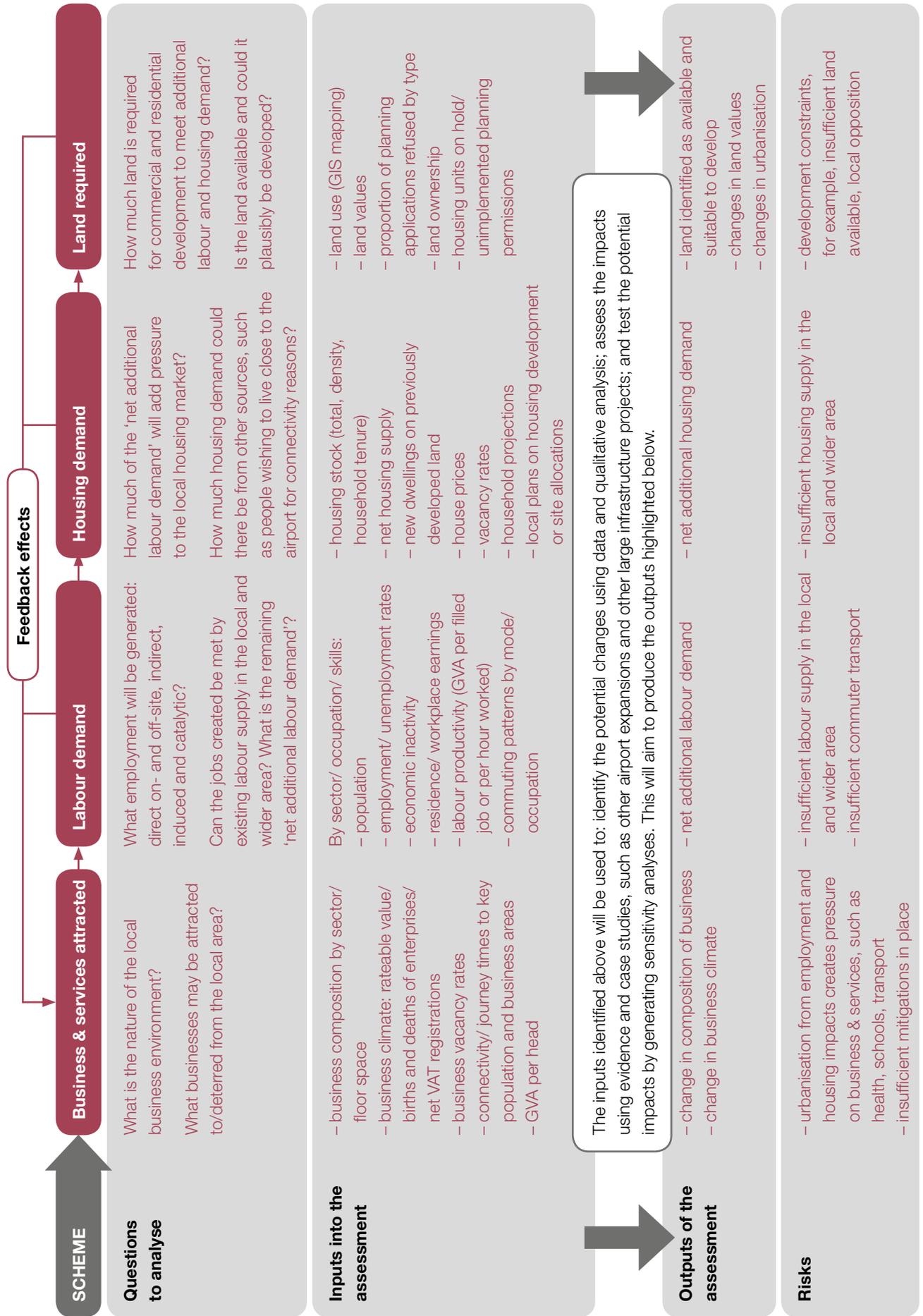
- 3.6** The Commission’s analysis of the local and wider impacts resulting from an airport scheme focuses on business and employment, housing, land development and urbanisation impacts, such as pressure on local services, facilities and amenities.
- 3.7** The assessment will identify the local impacts of an airport scheme relative to the baseline of how the local area might be expected to develop in the future.
- 3.8** Additionality impacts will be based on the net additional airport capacity created, measured by ATMs. This analysis will also identify displacement effects – for example, those jobs with scope to move location.
- 3.9** Inputs into the assessment will include:
- gathering statistics at a district level over time to understand recent trends, to identify the baseline and to describe how the local area might change in the future; and
  - using evidence and case studies to inform the analysis.
- 3.10** Other impacts such as those covered in the Economy Impacts module (including agglomeration, productivity spillovers), quality of life, sense of place, landscape and environmental impacts are analysed elsewhere in the Commission’s Appraisal Framework.

## Assessment

### Assessment base case

- 3.11** The base case will aim to describe the local area, in terms of local businesses, employment, demographics, housing, land use and land availability, by gathering local level data over time on the inputs into the assessments identified (see Figure A3.1). The analysis will identify recent trends and projections where possible. For example, ONS produces household projection statistics.
- 3.12** However, in many cases statistics are not projected and it will be necessary to make forecasts of the local area. This will be done where possible by using recent trends to describe how the local area might develop in the future irrespective of a proposed airport development. This base case will include infrastructure and other planned developments already in the pipeline and will include local plans for the area.

**Figure A3.1: The Airports Commission methodology to assess the local impacts of an airport option**



- 3.13** The base case described will be consistent with the Commission's 'do minimum' scenario referenced in other modules.

### **Assessment detail**

- 3.14** The Commission's approach to analysing the local economic impacts of a proposed airport scheme will first identify the area of impact, second analyse the assessment inputs, and finally identify the nature of the local impacts.

#### *Identify the area of impact*

- 3.15** The appraisal will focus on the impacts on businesses, employment, housing and services over a 60 year appraisal period.
- 3.16** The appraisal of the impacts will use the inputs identified (see Figure A3.1) at the lowest level of granularity available (such as, at district level). This will cover the core airport area identified in the airport proposal and the wider catchment area (specified by the Airports Commission, after further detailed assessment of the shortlisted long-term options proposed). The appraisal will consider the impacts of an airport proposal on the local area surrounding the airport under consideration, but also the potential impacts on the local and wider areas where affected. The Commission will work with the scheme promoters to define the spatial scale of the impacts.

#### *Analyse the assessment inputs*

- 3.17** The appraisal aims to identify the net additional impacts relative to the baseline, using the inputs presented in Figure A3.1. It is important to distinguish between the impacts that are additional and those that are displaced from elsewhere. For example, if an airport scheme generates local jobs, the appraisal will aim to identify those jobs that are net additional jobs created and those that are displaced from other locations. Hence, the appraisal will consider not only the airport in the scheme proposal, but also other airports and businesses in the local and wider area.

#### *Identify the nature of local impacts*

- 3.18** The local impacts will be defined, using evidence from research and case studies on other airport expansions or large infrastructure projects to identify their nature (such as their direction and magnitude) and to inform assumptions about how the indicators may change, and a number of scenarios will be presented. This assessment will not monetise the impacts, given that there is limited evidence in this area and the impacts are complex and uncertain. This appraisal will account for uncertainty in the baseline and the ex-ante assessment of impacts by using sensitivity and scenario analyses.

**3.19** Figure A3.1 summarises the approach to considering the multitude of local impacts resulting from an airport scheme. The approach establishes the potential degree of urbanisation by proceeding through an analysis of: local business climate, potential employment generated, labour market impacts and secondary impacts in terms of housing markets and the consequent land requirements for new business premises and new housing. The assessment will identify potential pressures and risks in the local area, for example, on public services including schools and roads. The key impacts are summarised along the top line of Figure A3.1, with the details of the assessment below.

### *Business and services*

**3.20** The appraisal will describe the commercial environment in the local and wider area. Depending on the airport scheme, this will aim to consider:

- (a) how prosperous an area already is, assessing the possibilities and viability for further commercial investment; or
- (b) if there is scope for an airport scheme to be the catalyst for regenerating an area; or
- (c) if a scheme may have a degenerative impact on the local area around other airport(s) in London and the South East.

**3.21** The analysis will aim to identify the potential changes in the composition of local businesses and business climate. A prosperous local business climate in an area will attract new business and generate local employment. There will be secondary impacts on physical and social infrastructure and services as the local area attracts more business and housing.

### *Labour demand*

**3.22** The appraisal of labour market impacts will assess the additional employment generated from the airport scheme by volume and skill mix, relative to the baseline employment identified. Analysis of employment will be broken down by:

- direct on- and off-site: employment related to the activities of the airport proposal and generated on the operation site and nearby;
- indirect: employment in the businesses that supply goods and services to the direct activities of the airport proposal;
- induced: employment effects that arise when the directly and indirectly earned incomes are spent in the wider economy; and
- catalytic: employment and income generated by the attraction, retention or expansion of economic activity resulting from the connectivity facilitated by airports.

**3.23** The analysis will indicate additional employment generated and, hence, labour demand and how much of the additional employment generated is likely to be met from:

- the existing labour force, in the local and wider catchment areas (for example, from increased participation rates and reductions in unemployment);
- the potential to transfer labour from other local jobs; and
- access to a potential larger pool of labour as a result of improved transport links proposed in a scheme's surface access strategy.

**3.24** Therefore, this analysis will identify the net additional labour demand that cannot be met in the local or wider area.

### *Housing demand*

**3.25** The resulting labour demand will attract labour supply and, therefore, add to housing market pressures, generating additional housing demand. There is also likely to be demand for housing from people wishing to live close to the airport for connectivity reasons.

**3.26** The analysis will aim to indicate how much of the pressure on the housing market can be met from the existing stock in the local and wider area, for example, by bringing vacant units back to use and by assessing household projections against residential developments in the pipeline. This analysis will aim to identify the net additional housing demand that cannot be met in the local and wider area. It will also consider the social infrastructure that will be required to support any net additional housing demand.

### *Land requirements*

**3.27** The assessment will aim to suggest the scale, type and location of land required to accommodate the business premises based on the additional employment generated. The land required will vary depending on whether the employment generated is off-site direct, indirect, induced or catalytic employment. The land required for new housing supply will be based on the net additional demand for housing that cannot be met in the local or wider area.

**3.28** The analysis will identify the scope for potential new commercial and residential development required and estimate whether it could plausibly be delivered in the local area, and the impacts of delivering such development. This may be via new developments, or by bringing vacant commercial and residential units back into use. Furthermore, associated infrastructure, such as transport and local services, will

also need to be provided. Potential risks may include constraints on development, such as insufficient land available to develop or local opposition.<sup>7</sup>

### *Feedback effects*

**3.29** Attracting new businesses to an area and identifying land to develop will generate further business opportunities. As people are attracted to live and work in the area, this will require additional physical and social infrastructure and services to be provided in the local area. The urbanisation impacts will feed into other appraisals, including Place, Quality of Life and Community.

### *Regional impacts*

**3.30** The assessment of the regional economic impacts of an airport option, such as improvements in regional connectivity provided by domestic flights, will be analysed as part of the connectivity benefits, detailed in Strategic Fit.

## **Outputs of the assessment**

**3.31** Figure A3.1 will help identify the outputs of the assessment of an airport scheme on the local area and spillovers into the wider region, which include:

- changes in the business composition and climate in the local area, and additional services required;
- additional labour demand, resulting from: estimates of the volume and type of employment associated with an airport scheme; information on local labour supply characteristics and travel to work catchment areas of commuters by skill type; and the role of a wider catchment area to meet labour demand requirements in addition to the core catchment area;
- additional housing and infrastructure demand, resulting from additional labour supply attracted to the local area; and
- additional land required for commercial, residential and public development over that already allocated in the local planning authority's local plans, and changes in land use. Indicative estimates of changes in land values resulting from changes in land use may be monetised for illustration purposes only.

**3.32** This assessment will highlight the risks and associated pressures on public services resulting from urbanisation, and will identify potential mitigations to these risks and pressures.

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<sup>7</sup> The scale, location and type of land required for development will be considered in the Place appraisal.

- 3.33** The Commission may also wish to identify through this appraisal other areas of potential investment in the local area, where possible.
- 3.34** Additional outputs of the assessment include describing the impacts on the local areas surrounding other airports in London and the South East (for example, net changes in labour demand and housing demand in a local area).
- 3.35** The outputs of this appraisal will be used to inform the Surface Access assessment and vice versa to develop the analysis of the impacts collaboratively.

## 4. Surface access

Objectives		<p><b>To maximise the numbers of travellers arriving at the airport on public transport, or promote green modes of transport;</b></p> <p><b>To accommodate the needs of other users of transport networks, such as commuters, intercity travellers and freight;</b> and</p> <p><b>To enable access to the airport from a wide catchment area.</b></p>
Business Case	✓	Aspects of this module are considered in the Economic Case and Financial Case.
Sustainability Assessment	✓	Surface access is likely to impact on the sustainability assessment of any scheme.

### Introduction

#### **Maximising the number of travellers who arrive at the airport on public transport, or promote green modes of transport**

- 4.1** Increasing the use of public transport is important in enabling both airports and the UK to meet their environmental obligations.
- 4.2** The Commission will wish to see schemes which demonstrate that, so far as possible, they provide both the ability and the incentives for passengers to use public transport on their way to or from the airport. The Commission will take a particular interest in strategies to maximise the use of public transport by the airport's workforce.
- 4.3** Proposers are encouraged to be innovative in their approach and to consider not only present technologies and infrastructure, but also those which may come into being during the period when new capacity is being delivered and onward into subsequent years.
- 4.4** Ambitions on mode share will need to be balanced against the objectives set out on cost and affordability.

## **Accommodating the needs of other users of transport networks, such as commuters, intercity travellers and freight**

- 4.5** Airport surface transport does not exist in isolation. In most cases, it shares road or rail infrastructure with commuters, intercity travellers, freight and other transport users.
- 4.6** The Commission will look at whether schemes' surface access plans unduly harm the interests of these other users, either in terms of overly constraining the capacity available to them or adversely affecting the cost of their journeys.

## **Enabling access to the airport from a wide catchment area**

- 4.7** Major airports serve not only their local communities, but also users from a much wider catchment area. The Commission will look at whether proposals provide good accessibility from a wide range of origin points, both in London and rest of the UK.
- 4.8** The Commission will consider the airport's surface access catchment area alongside its workforce strategy to consider whether the two are aligned.
- 4.9** While in the case of more distant regions it may be sufficient to demonstrate that proposals provide the capacity for domestic air links, in other cases it will be necessary to demonstrate that they would provide good surface transport links for users from other UK cities and regions.

## **Outline**

- 4.10** This module will consider the surface access requirements of each proposal under consideration. A range of scenarios may be tested for each option, reflecting the need to balance different objectives. The impacts of surface access will be felt across the range of modules identified in the Appraisal Framework. In particular, the outputs of the surface access module will inform the Local Economy Impacts, Air Quality, Place and Cost and Commercial Viability modules (though others will also be affected).
- 4.11** The assessment will consider the modal split of different surface access transport, which can be broken down as follows:
- road (private car, hire car, taxi, coach, bus);
  - conventional rail (airport express services, regional/commuter services); and
  - High Speed Rail.

- 4.12** The assessment will identify the impacts of the surface access strategies on the local and wider area. In addition, the impacts on the surface access transport to/from other airports will be considered. Whilst there may be improvements to surface access transport to some airports, there may be reductions or degradations to other airports' surface access and potential disbenefits if there is reduced connectivity to other airports or increased journey time across London.
- 4.13** The assessment will also build on work that was done during Phase 1 regarding the surface transport catchment areas of proposals.
- 4.14** The assessment will seek to establish:
- the nature of the most credible surface access proposition for each scheme under consideration;
  - the modal shift likely to result from that proposition;
  - the impacts of the proposition on existing surface transport flows; and
  - the number of people able to reach the airport using surface transport using a variety of modes, within set journey times.
- 4.15** Surface access propositions may be refined in light of emerging conclusions from Cost and Commercial Viability, Environment and other appraisal modules.

## Assessment

### Assessment base case

- 4.16** The impacts will be assessed against the base case, which includes current plans for surface access development and infrastructure, and behavioural changes, for example modal split or modal shift. Particularly, the base case includes: full delivery of the Commission's short- and medium-term options, HS2 (not including the proposed spur to Heathrow airport), Crossrail and all railway investment 2014-19, as planned in Control Period 5.<sup>8</sup>

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8 <https://www.gov.uk/government/publications/airports-commission-interim-report>  
<http://hs2.org.uk/>  
<http://www.crossrail.co.uk/>  
<https://www.gov.uk/government/publications/high-level-output-specification-2012>

## Assessment detail

**4.17** The Commission will construct a surface access strategy for each scheme, drawing in part upon materials submitted to it by proposers as part of the updated scheme design. In drawing up these surface access strategies, the Commission will be led by its objectives as defined at the start of this module. This will involve giving regard to a number of subsidiary issues, including (but not necessarily limited to):

- the passenger throughput required to support the scheme's stated capacity;
- the cost to the traveller and the potential impacts of this upon the utilisation of the proposal;
- comfort and convenience for the traveller;
- reliability and resilience of surface transport links;
- the range of origin and destination points accessible;
- impacts upon levels of congestion;
- consequent environmental impacts, such as air quality, noise and carbon;
- the particular needs of users of air freight;
- the particular needs of airport workforce;
- impact on wider transport networks and pinch-points, such as city centre terminal capacity; and
- interface with airport terminals.

**4.18** The surface access strategy will be assessed to identify whether it is viable and deliverable and supports the Commission's objectives. In some cases, this may involve an iterative process of refinement around the strategy.

**4.19** The outputs of this assessment module will also inform a number of other environmental, people and cost assessments.

**4.20** Appraisals will take into account the requirement for new infrastructure and operations, as well as the impacts upon existing surface transport operations.

**4.21** This module will not be used to make an assessment of the costs of surface transport links. However, the surface transport strategies assembled for each proposal as part of this module will be taken forward for further assessment as part of the Cost and Commercial Viability Module.

## Datasets

**4.22** A variety of data sources will be used. These will range from data provided by scheme promoters, airports, DfT's modelling inputs, the Highways Agency, Network Rail and Train Operating Companies.

## Outputs of the assessment

**4.23** For each proposal, this module will produce:

- an optimised surface transport package;
- indicative public transport mode share figures;
- an assessment of the impacts of the surface transport package upon existing traffic flows; and
- isochrones illustrating journey times and catchment areas for passengers and freight.

## 5. Noise

Objective		<b>To minimise noise impacts.</b>
Business Case		Benefits and costs in relation to the Commission's do-minimum are considered in the Economic Case, on a monetised basis.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

### Introduction

- 5.1** The Commission's spring 2013 *Aviation Noise* discussion paper generated a strong response, eliciting over 400 replies from airports, local councils, campaigners, members of the public, acoustic specialists and others.<sup>9</sup> These responses have outlined the importance of measuring noise impacts accurately, and fairly evaluating its potential effects.
- 5.2** A number of respondents supported the continued use of the  $57L_{Aeq16h}$  to describe the noise impact of an airport, suggesting that historical comparability provides consistency for residents, airports and aircraft manufacturers. However, a large number of responses maintained that using this measure alone does not accurately reflect the impact of aviation noise, because it bears little relation to the perceived noise impacts. Numerous respondents urged the Commission to apply a combination of metrics, supporting its suggestion of a 'noise scorecard' approach, including metrics on frequency of flights, as well as average noise exposure contours.
- 5.3** Many respondents commented on how the impacts of noise are measured. Some, for example, were unsure about monetising impacts, stating that many communities would prefer a focus on reducing noise rather than considering monetisation. Many others supported monetisation in principle, seeing it as an essential element of weighing up the costs and benefits of each option, but warned the Commission that considering noise just by using monetary values was not appropriate, mainly due to the lack of consensus over the best monetisation approach. Among those supportive of monetisation, approaches based on Stated Preference<sup>10</sup> and quantifiable health impacts were favoured.

<sup>9</sup> <https://www.gov.uk/government/publications/stakeholder-responses-to-airports-commission-discussion-papers>. All substantive responses are published online.

<sup>10</sup> A valuation technique used to elicit people's willingness to pay, which can be estimated by asking people what they would be willing to pay for a particular benefit.

- 5.4** Promoters' schemes should demonstrate that they have minimised the population that would be exposed to aircraft noise, consistent with the safe and efficient utilisation of airport infrastructure. Schemes should also give details of any strategies that could be put in place to mitigate their impacts upon populations affected by noise, such as respite regimes, and should identify whether these mitigations would be permanent or time-limited features. Schemes should clearly identify any night-noise implications and give details of their strategies for mitigating the impacts of night flights. Finally, schemes should also explain their noise impacts on designated sites, conservation areas, heritage sites and tranquillity and give details of any strategies for mitigating these impacts.
- 5.5** Noise is highly complex to model and evaluate, and it affects people in different ways. In recognition of this the Commission will assess noise impacts using a large variety of measurement descriptors and reporting approaches.

## Outline

- 5.6** The Phase 2 noise appraisal will be underpinned by detailed contour maps based on a selection of average and frequency based noise measures. To model these measures the Commission will use the CAA's Air Noise Contour (ANCON) model.
- 5.7** Noise emissions will be assessed based on the net national impact of each scheme (i.e. considering the net change in the number of people affected by stated thresholds of noise).
- 5.8** In addition, specific nuances of noise impacts will be assessed at a local level, considering background noise levels.
- 5.9** These data will be used to estimate the changes in areas of land, number of people, households and other amenities (such as schools) that are affected by aircraft noise including any that are newly exposed to or removed from aircraft noise.
- 5.10** The costs and benefits of a scheme's noise impact will be monetised, and effects on annoyance, health and quality of life will be described.
- 5.11** The impact of noise on areas of tranquillity, heritage or landscape importance are considered in the Place module. The impacts of noise on ecosystems are considered in the Biodiversity module. The impacts of noise on quality of life are further explored in the Quality of Life module.

*Airports can change their operations to manage aircraft noise. For example, at Sydney Airport, Airservices Australia – Australia’s airport services including air traffic control provider – must ensure that, subject to safety and weather conditions, as many flights as practical come and go using flight paths over water or non residential areas; that the rest of the air traffic is shared over surrounding communities as fairly as possible; and runway noise sharing modes should change throughout the day so that individual areas have some respite from aircraft noise on most days.*

*The Commission asks scheme promoters to consider operational changes and/or other approaches that could form part of their scheme designs to mitigate local adverse impacts of aviation.*

## Assessment

### Assessment base case

- 5.12** The aviation noise implications of a scheme will be considered on both a national and local level. Noise will be assessed for each option in relation to two base cases.
- 5.13** The national (or ‘system-wide’) assessment will be measured in relation to the Commission’s ‘do-minimum’ scenario which captures, as far as possible, the predicted future levels of airport traffic at different airports, and the areas of land and numbers of houses contained within stated noise levels. The do-minimum will also account for predicted technological improvements to the aircraft fleet.
- 5.14** The local assessment will function in a similar way to the national assessment, but will consider in greater detail the changes to noise environments in and around short-listed airports, including particular areas of tranquillity, potential future land uses and surface access noise. Therefore, whereas the national assessment only considers changes to aircraft noise, a local assessment will also be made in relation to existing background noise.

### Assessment method

- 5.15** Changes to the national and local noise environment will be modelled against these base cases. The overall modelling assessment will progress in the following stages:
- assessment of aviation noise impacts associated with a scheme (including any other airport sites affected);
  - for the local assessment, a high level consideration of changes to surface access noise, modelled where a 25% or greater change in traffic flow is expected;

- the estimation of the propagation of emissions from all identified sources, including accounting for local meteorology, within pre-defined study areas;
- an exposure assessment to determine the population and amenities (comprising schools, hospitals, community centres and places of worship) exposed to changes (positive or negative) to the relevant base case.

**5.16** The implications of different applications of respite will be fully considered in relation to all of the above.

## Assessment detail

### *Noise sources and descriptors used in the assessment*

**5.17** Aviation noise will be assessed for both take off and landing, accounting for engine and airframe noise, and will be evaluated using the metrics displayed in the table below. Given the large volume of data collected here, while the full range of assessments will be required for the purposes of monetisation, the Commission will use its judgement as to how this information can be best interrogated and displayed for public consultation.

Noise measure	Contours	Description
LA <sub>eq</sub>	54-72 dB L <sub>Aeq16h</sub> , average summer's day, 54, 57, 60, 63, 66, 69 and 72 dB contours.	Average noise experienced during the day between 0700 and 2300. For the purposes of modelling, assumptions on modal splits (percentage of westerly or easterly runway operation) will be based on a last five year average.
	48-72 dB L <sub>Aeq8h</sub> , average summer's night, 48, 51, 54, 57, 60, 63, 66, 69 and 72 dB contours.	Average noise experienced during the night between 2300 and 0700.

Noise measure	Contours	Description
$L_{DEN}$	$L_{DEN}$ from 55 dBA (24-hour).	Under EU Directive 2002/49/EC, noise maps are generated every 5 years for $L_{DEN}$ , which is calculated based on the annual average 24-hour $L_{eq}$ , with weightings of 5 dB for evening (1900-2300) and 10 dB for night-time (2300-0700).
'Number above' frequency contours	N70 day and N60 night 'number above' contours.	'Number above' contours describe the number of noise events (N) exceeding an outdoor maximum noise level ( $L_{max}$ ). The 70 dB(A) outdoor level is commonly chosen as the $L_{max}$ level because it roughly corresponds to the potential onset of indoor speech interference of 55-60 dB(A) (allowing for 10-15 dB attenuation by the building envelope with open windows). The Commission believes this noise metric is useful for describing aircraft flyover frequency. The Commission's 10 dB lowering of $L_{max}$ levels for night time flights reflects the increased sensitivity to noise heard at this time, in common with Europe's $L_{DEN}$ indicator.

**5.18** Additional work may be undertaken by the Commission in relation to specific options and configurations of options (for example, examining noise at particular times of day). Equally, the Commission may decide to undertake additional modelling in line with other noise metrics discussed in its summer 2013 discussion paper *Aviation Noise*.<sup>11</sup> Where this does occur this analysis will be presented alongside the above assessments.

#### *Temporal scope of the assessment*

**5.19** Noise impacts will be modelled over a 60 year appraisal period.

#### *Sensitivities to be applied to the assessment*

**5.20** Noise assessments are particularly sensitive to assumptions used when modelling the impacts, most significantly:

- air traffic forecasts and the associated projections made about changes in fleet mix (in this case to include the fleet-specific noise characteristics);
- arrival and departure flight tracks, which influence significantly upon those affected and upon the shape of noise contours;
- allocation of operations to runways and flight tracks (for example whether a runway is operated in segregated or mixed-mode);
- modal split assumptions; and
- assumptions on changes to housing and population over time.

**5.21** As options develop, the Commission will work with aircraft manufacturers and other groups to develop appropriate assumptions and sensitivities in these areas. The Commission will also be working with advisors to develop option-specific plans for airport and airspace operations, to feed into the noise modelling process.

**5.22** To deal with sensitivities which might exist in the noise modelling, when calculating noise impacts the Commission will seek to provide a range of outputs to reflect any uncertainty.

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11 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/223764/airports-commission-noise.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223764/airports-commission-noise.pdf)

## Datasets and modelling

- 5.23** All aviation noise assessments will aim to be consistent, as appropriate with the assessment practices and procedures specified by the Environmental Noise (England) Regulations 2006 as amended and the European Commission's Environmental Noise Directive.<sup>12</sup>
- 5.24** Modelling aviation noise will be undertaken using the ANCON model. The model has been developed on behalf of the Department for Transport and is managed and operated by the Environmental Research and Consultancy Department (ERCD) arm of the CAA. It holds a comprehensive database for Heathrow and Gatwick, tailored towards typical UK operations, and works with actual noise characteristics (which in some cases differ from those stated in noise certification data). Essentially ANCON uses observed flight profiles gathered from airports and estimates engine power and operating procedures from this. The CAA will work with scheme promoters to perform assessments.
- 5.25** In addition, the Commission may also undertake supplementary modelling work on the Federal Aviation Authority's Integrated Noise Model (INM).

## Outputs of the assessment

- 5.26** The results of the noise assessment undertaken will include:
- absolute change in the number of people exposed to aviation noise nationwide;
  - absolute change in the number of amenities exposed to different noise levels (e.g. schools, hospitals, community centres, places of worship, etc.);
  - absolute change in the land area affected by noise; and
  - a discussion of likely impacts on local noise environments.
- 5.27** These outputs will be complemented with appropriate noise contour maps. In addition, noise assessment will produce:
- a sustainability assessment against this module's stated objective; and
  - monetisation of stated noise impacts.

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12 <http://ec.europa.eu/environment/noise/directive.htm>

## Monetisation

- 5.28** There is no commonly agreed methodology for monetising aviation noise. Previous assessments have been undertaken using DfT WebTAG methodology, which accounts for the annoyance caused by noise. More recent research has considered the monetisation of sleep disturbance and some health impacts.
- 5.29** The Commission will monetise impacts in all of these areas, detailed below, enabling it to calculate a range of monetised impacts to suit a central scenario and a range around it.
- 5.30** Monetisation of annoyance will be undertaken using the DfT WebTAG methodology, based on daytime  $L_{Aeq16h}$  noise exposure.
- 5.31** Monetisation of sleep disturbance will be undertaken using the methodology presented in ERCD Report 1209.<sup>13</sup> This is based on  $L_{Aeq8h}$  night noise exposure.
- 5.32** Monetisation of Acute Myocardial Infarction (AMI), hypertensive strokes and hypertensive dementia will be undertaken using the corresponding methodologies presented in ERCD Report 1209 (previously referenced). It is based on  $L_{eq}$  noise exposure, combining 16-hour daytime and 8-hour night time metrics to obtain an un-weighted 24-hour noise exposure metric.
- 5.33** Details of all assessment outputs are summarised in Table A5.1.

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13 Proposed methodology for estimating the cost of sleep disturbance from aircraft noise, CAA/ERCD.

**Table A5.1: Proposed noise scorecard***Noise measurements*

Period	Average measure (Contour maps with population/area/other sites affected)		Frequency measure (based on number above contour)
	UK measure	EU measure	
<b>Day</b>	54-72 $L_{Aeq16h}$ in 3 dB increments		'Number above' N70 contour
<b>Night</b>	48-72 $L_{Aeq8h}$ in 3 dB increments		'Number above' N60 contour
<b>24-hour</b>		55 $L_{DEN}$	'Number above' N70 contour (day) and 'Number above' N60 contour (night) combined

*Noise valuation (monetisation)*

Period	Average measure		
	Annoyance	Sleep disturbance	Health
<b>Day</b>	DfT WebTAG methodology based on $L_{Aeq16h}$		Methodology detailed in ERCD Report 1209 based on $L_{Aeq24h}$
<b>Night</b>		Methodology detailed in ERCD Report 1209 based on $L_{Aeq8h}$	

*Noise and quality of life*

Period	Average measure	
	Local performance against wellbeing indicators	Evaluation of possible mitigation measures relating to wellbeing
<b>N/A</b>	Qualitative	Qualitative

## 6. Air quality

Objective		<b>To protect local air quality.</b>
Business Case		Benefits and costs in relation to the Commission's 'do-minimum' case are considered in the Economic Case, on a monetised basis where necessary.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

### Introduction

- 6.1** Poor air quality detrimentally affects human health and quality of life, as well as the healthy functioning of natural ecosystems. Airports and their associated activities are potential sources of pollutants that impact on local air quality and contribute towards national emission levels. A range of stakeholders have highlighted that airports and their surrounding access routes may give rise to air quality problems.
- 6.2** The Commission is mindful of the need to take account of domestic and European legislation that impose limits upon levels of air pollution. It is essential that scheme promoters demonstrate a credible case that can be delivered in this context. Schemes should give consideration to any urbanisation and the consequent impacts this might have upon air quality levels. Schemes should also give details of any strategies that could be put in place to mitigate air quality impacts.
- 6.3** The Commission's assessment will consider the local and national air quality impacts of schemes including, as far as possible, Surface Access Strategies.

### Outline

- 6.4** The Phase 2 air quality appraisal will calculate emissions from each scheme's airport and associated surface access.
- 6.5** Local scale dispersion modelling will be undertaken to identify the concentrations of pollutants produced in the local area, and any resultant impacts on health and likely exceedances of EU limit values.
- 6.6** Scheme contributions to exposure of the population to pollution at a national scale will also be calculated.

- 6.7** As a minimum, modelling will be conducted for initial operations and mature operations phases.
- 6.8** The construction phase is not required to be modelled explicitly as part of this high level appraisal. However, useful information on the length of time and likely scope of effects will be recorded, together with any relevant mitigation measures.
- 6.9** The pollutants considered will be those subject to European and national legislation which are recognised as being of concern at or near airports and also nationally, namely  $\text{NO}_x$ ,  $\text{NO}_2$ ,  $\text{PM}_{10}$  and perhaps  $\text{PM}_{2.5}$ .<sup>14</sup>
- 6.10** The cost of any increases in exposure to pollution will be monetised, and health impacts considered.
- 6.11** The modelling undertaken on air quality will also be used to assess impacts on ecosystems. This assessment is considered in the Biodiversity module.

*Improving air quality in and around airports requires a multi-faceted approach. At a 2008 public hearing the New York and New Jersey Ports Authority (NYNJPA) outlined the measures it was taking to improve air quality at its five airports. These included renovating and restructuring runways and taxiways to minimise aircraft congestion (and therefore fuel burn), increasing the use of fixed ground power and pre-conditioned air systems by aircraft, and planning to implement hydrogen-fuelled tugs, electric hybrid buses and electric ground surface equipment.*

*In terms of surface access, the NYNJPA cited the AirTrain links to Newark and JFK airports as effectively reducing the number of people arriving at these airports by car. And at Teterboro Airport strong, pan-organisational governance arrangements were established to monitor the implementation of all measures, and to consider further actions that could be taken. The Commission asks scheme promoters to consider how innovative design, construction and social engagement plans can seek to combat the possibility of poor air quality in their schemes.*

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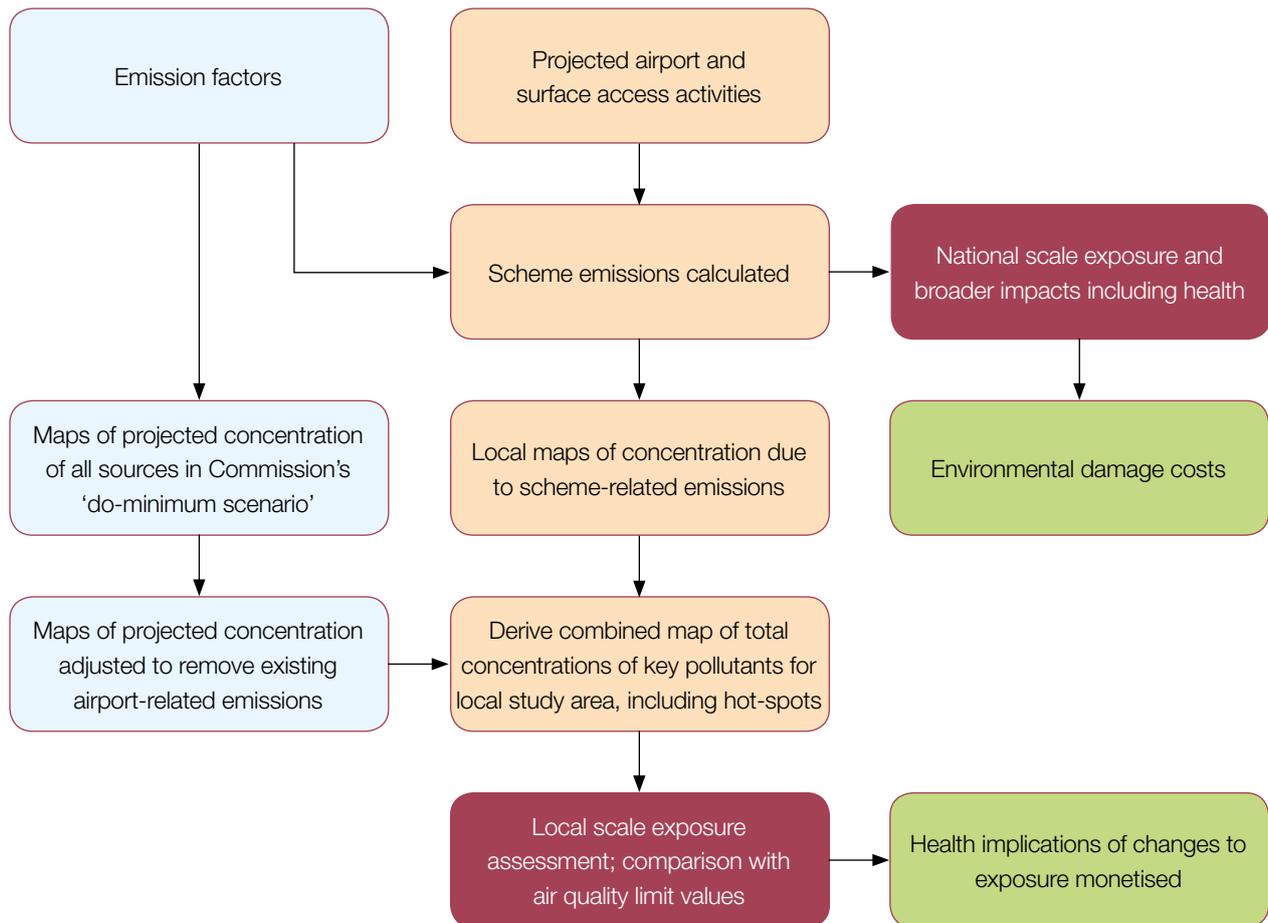
14 The Project for the Sustainable Development of Heathrow determined that the principal pollutants of concern were  $\text{NO}_x$ ,  $\text{NO}_2$  and  $\text{PM}_{10}$   
<http://www.shepway.gov.uk/webapp/lydd-airport/CORE%20DOCS/CD12/CD12.5.pdf>

## Assessment

### Assessment base case

**6.12** Assessments will be undertaken in relation to the Commission's 'do-minimum' scenario, and local and national projections of air quality, as set out in Figure A6.1.

**Figure A6.1: Air quality assessment process**



## Assessment methodology

**6.13** The assessment is split into two parts:

- the local air quality assessment, including an assessment of the risk of exceeding limit values; and
- an assessment of pollution at a national scale, including performance in relation to emissions ceilings.

**6.14** For the local assessment, the first stage will be the determination of the local impact of the scheme on air quality due to emissions from the airport and associated surface access routes. This will then be considered in relation to projected local air quality concentrations. Two outputs are considered: impacts on health, in terms of changes in exposure to pollution at affected properties in the study area; and non compliance with EU Limit Values.

**6.15** The national assessment will consider a scheme's projected emissions in terms of its contribution to exposure of the population to pollution at a national scale. Associated health impacts will be captured and monetised.

### Local assessment

**6.16** The air quality implications of a scheme will be considered against the air quality projections for all locations influenced by the scheme, based on background concentration projections, with reasonable adjustments to account for any future improvements, expansions or new builds commissioned within the local area that are not associated with the specific airport scheme being assessed. The change in air quality in future year scenarios including initial operations and mature operation phases should be assessed.

**6.17** The local assessment will progress in four stages:

- calculation of all changes in emissions arising from the operational impacts of a scheme, including those related to air transport, surface transport and airport operations, using vehicle fleet and infrastructure data, levels of use, and standardised emission factors;
- the estimation of the dispersion of emissions from all identified sources, accounting for local meteorology, within pre-defined study areas to give total pollutant concentrations;

- an assessment to determine the population exposed to the local air quality impact of the scheme; and
- an assessment of risks of exceeding EU limit values using the Government's national air quality compliance assessment.

**6.18** In addition, information will be collected on additional disturbance and emissions during construction, including time schedule and specific areas affected. This will not need to be modelled in detail at this stage.

**6.19** A sustainability assessment will be undertaken against the relevant sustainability objective. Assessment should consider in particular the risk of exceeding EU limit values, as well as their projected severity and duration, and the magnitude and severity of any health impacts.

### Assessment detail

<p>What emissions sources will be captured in the assessment?</p>	<p>The emission sources directly modelled for an assessment will include:</p> <ul style="list-style-type: none"> <li>• aircraft-related emissions, including engine exhaust emissions in the landing and take-off cycle below 915m (3000 feet) including take off, landing, approach and idle;</li> <li>• Auxiliary Power Unit emissions;</li> <li>• surface access emissions on major road networks and railways, including engine exhaust emissions;</li> <li>• fugitive PM emissions from brake and tyre wear;</li> <li>• emissions from Ground Support Equipment; and</li> <li>• non-airport related sources in the local area surrounding the airport.</li> </ul>
<p>What is the temporal scope of the assessment?</p>	<p>Air quality impacts will be modelled for schemes' initial operations and mature operations phases as a minimum.</p>

What is the spatial scope of the assessment?	The geographical scope of the assessment is defined as the airport boundary and environs, high risk zones on the lines of route of any new proposed surface access, and any high risk areas on existing surface access routes where significant changes to traffic flows are predicted (this is typically defined as changes in Annual Average Daily Traffic flow of more than 5% and changes in peak traffic flows of more than 10%).
How to undertake a population exposure assessment?	The population exposed to the air quality impact of the scheme will be calculated by determining the number of properties located within affected areas. The Commission will use the methodology in WebTag guidance from the Department of Transport as a basis for determining property numbers within the vicinity of affected roads.

### *Sensitivity analysis*

- 6.20** Air quality assessments are particularly sensitive to future projections of vehicular surface access, aircraft fleet mix and turnover, the future uptake of new vehicle and fuel technologies, projections of non-airport emissions, projections of future housing and other urban developments, influence of climate change and meteorology. Sensitivity analysis will be constructed for these variables as appropriate.

### **Datasets and modelling**

- 6.21** All assessments will be conducted in accordance with the processes, practices and datasets specified in Local Air Quality Management, Technical Guidance LAQM.TG (09). Further guidance, specifically for assessing the impact of air quality at airports, is available from the International Civil Aviation Organization (ICAO).<sup>15</sup> The approach taken should, where possible, be based on the ICAO ‘sophisticated’ level, except where source activities have been screened as being not significant.
- 6.22** The dispersion models used will be proven as fit for purpose and have been subject to verification against quality controlled monitoring data.
- 6.23** Modelling of emissions may make use of the following datasets and toolkits, and where special assumptions might be taken into account – for example, the effect of slower climb rates on emissions at take-off – this should be made clear:

15 Airport Air Quality Manual, (2011) Doc 9889, ICAO

- ICAO Emissions Factor Databank<sup>16</sup> – this databank contains information on exhaust emissions of aircraft engines. Additional emission factors on airport operations are available from the US Federal Aviation Administration.<sup>17</sup>
- Emissions Factor Toolkit – a spreadsheet tool that allows the calculation of road traffic exhaust emissions for different vehicle categories and splits, at various speeds, and on different road types.<sup>18</sup>
- Emissions Factor Database – this database contains the emissions factors used in the UK National Atmospheric Emissions Inventory, as well as factors specially designed for local inventories.<sup>19</sup>
- National Atmospheric Emissions Inventory – an inventory of many sources of emissions including roads and airports for the UK.
- London Atmospheric Emission Inventory – a detailed emission inventory for the Greater London area, including road traffic flows.

**6.24** National air quality background concentration maps for years through to 2030 are available from the Department for Environment and Rural Affairs in a 1x1 km grid.<sup>20</sup>

## Outputs of the assessment

**6.25** Outputs of the assessments shall include:

- air quality pollutant concentration maps of all locations substantially influenced by the scheme;
- the number of properties and population where air pollutant concentrations improve, worsen or stay the same;
- the changes in local pollutant concentrations between the Commission's 'do-minimum' and scheme options, in initial operation years and mature operation years;
- monetisation of health impacts;
- assessment against the stated sustainability objective; and
- assessments of other potential air quality mitigation measures proposed by scheme promoters in their updated scheme designs.

16 <http://easa.europa.eu/environment/edb/aircraft-engine-emissions.php>

17 [http://www.faa.gov/about/office\\_org/headquarters\\_offices/apl/research/models/edms\\_model/](http://www.faa.gov/about/office_org/headquarters_offices/apl/research/models/edms_model/)

18 <http://laqm.defra.gov.uk/review-and-assessment/tools/emissions.html#eft>

19 <http://naei.defra.gov.uk/data/ef-all>

20 <http://laqm.defra.gov.uk/maps/maps2010.html>

## National assessment

- 6.26** Beyond the local scale, emissions generated by airports disperse further, contributing to pollution levels across the UK (and, for some pollutants, Europe). This results in a broader range of effects. Away from the source NO<sub>x</sub> can lead to secondary pollutants, including secondary particulate matter, which can affect the health of the population. NO<sub>x</sub> can also contribute to the formation of ozone and nitrogen deposition, which can have possible effects on ecosystems and biodiversity.
- 6.27** These broader impacts will be captured through consideration of environmental damage costs based on calculations of population exposure per unit emission for different source categories of PM, and per unit emission of NO<sub>x</sub>. The Commission proposes using information from Defra, which provides tabulated concentration-response coefficients for specific health impacts, to calculate these costs.<sup>21</sup>
- 6.28** In addition, this assessment will consider potential breaches of the UK's emissions ceilings.
- 6.29** A sustainability assessment will be undertaken against the relevant objective. Assessment should consider in particular the risk of any exceedances of emissions ceilings, as well as their projected severity and duration, and the magnitude and severity of any health impacts.

## Outputs of the assessment

- 6.30** The outputs of the assessment shall include:
- the changes in national pollutant concentrations between the Commission's 'do-minimum' and scheme options, in scheme initial operations and mature operations phases as a minimum;
  - monetisation of health impacts; and
  - assessment against the stated sustainability objective.

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21 Guidance on the Impact Pathway approach is available from [www.gov.uk/air-quality-economic-analysis](http://www.gov.uk/air-quality-economic-analysis).

# 7. Biodiversity

Objective		<b>To protect natural habitats and maintain biodiversity.</b>
Business Case		Benefits and costs in relation to the Commission’s ‘do minimum’ will be considered in the Economic Case – potentially on a monetised basis. Scheme performance in relation to environmental legislation will be outlined in the Strategic Case.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

## Introduction

- 7.1** All developments considered in Phase 2 should aim to avoid harm to biodiversity, including through avoidance and mitigation of impacts. The Commission defines biodiversity as the variety of life in all its forms, encompassing all species of plants and animals and the complex ecosystems of which they are a part.
- 7.2** Any major infrastructure, especially that which may affect a large geographical area, such as an airport and its associated surface access infrastructure, is likely to impact to some extent on biodiversity and Ecosystem Services.<sup>22</sup> This assessment aims to allow the Commission to understand where these impacts may occur and how they ought to be quantified and addressed.
- 7.3** Development also has the potential to enhance the natural environment, and the Commission is keen to understand the opportunities, as well as the risks, that airport schemes may provide.
- 7.4** Schemes should provide clear strategies for mitigating environmental impacts, consistent with the relevant legal frameworks.

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<sup>22</sup> Ecosystem Services can be defined as benefits that people derive from nature including production of clean water, regulation of climate and flooding, soil formation and crop pollination, as well as cultural benefits such as aesthetic and recreational values. Assessment of Ecosystem Services is therefore different from biodiversity assessment, as the latter considers impacts on biodiversity ‘for its own sake’, rather than for what the biodiversity can provide to society.

## Outline

- 7.5** The Phase 2 appraisal of biodiversity will consist of two distinct assessments.
- 7.6** The first assessment will identify the sites of particular biodiversity interest, such as designated sites of international, national and local importance, and protected and priority species and habitats, present in the areas around airport schemes. Where necessary, the Commission will embark on a process of habitat screening.
- 7.7** Environmental capital will be assigned to these resources, correlating to the level of protection they are placed under in international, European or national legislation, or local protection policies.
- 7.8** The inherent impact of a scheme on the biodiversity of these sites will be estimated, at a strategic level.
- 7.9** The second assessment will consider at a high level the impact on Ecosystem Services, as defined in Natural England's 'National Character Areas' (NCA) publications. These documents provide profiles of the UK's 159 areas, including their biodiversity and ecosystem characteristics, and provide a strategic context for any potential infrastructure development.
- 7.10** These Ecosystem Services appraisals will cover the broad geographical area surrounding an airport (in other words, they will not be restricted to the sites of particular biodiversity interest). The value of an Ecosystem Services approach is that it enables a wider range of impacts on ecosystems and the benefits they provide to society to be captured and considered than a simple biodiversity assessment.
- 7.11** In addition, impacts may be monetised using the Ecosystem Services Framework, in conjunction with DfT's WebTAG and Treasury's Green Book.
- 7.12** For both assessments impacts will be assessed against the defined sustainability objectives.
- 7.13** The assessments will consider the ecological impacts of incidences of bird strike, changes to an area's air quality and changes to an area's noise environment. The ecological impacts of changes to a water environment are considered in the Water and Flood Risk module.
- 7.14** Potential mitigation strategies which fall outside of scheme promoters' central Environmental Strategy will be documented, and post-mitigation impacts will be defined. Mitigations will be costed, and the achievability of suggested mitigations will be assessed.

## Assessment

### Assessment base case

**7.15** The assessment baseline of the first biodiversity assessment will be defined by identifying all biodiversity features of international, national and local importance that may be affected by the airport schemes, comprising biodiversity protected in:

- European Legislation:
  - Special Areas of Conservation (SAC);
  - Special Protection Areas (SPA);
  - Ramsar sites; and
  - European Protected Species.
- Sites that have the same protection as sites in European Legislation:
  - candidate Special Protection Areas;
  - candidate Special Areas of Conservation;
  - candidate Ramsar sites; and
  - sites identified as essential for compensatory measures to mitigate adverse effects on SACs, SPAs and listed Ramsar sites.
- National Legislation:
  - National Nature Reserves;
  - Sites of Special Scientific Interest;
  - Ancient Woodlands;
  - Marine Conservation Zones;
  - species protected under the Wildlife and Countryside Act; and
  - priority habitat and sites holding priority species.
- Regional and Local Legislation or Action Plans:
  - Local Wildlife Sites;
  - Local Nature Reserves; and
  - habitats and species listed in the Red Data Book.

**7.16** Where it is possible to articulate a clear trend for the biodiversity within these sites, this shall form part of the assessment baseline. The assessment baseline of these protected sites will be defined in relation to the information captured in Natural England's NCAs.

**7.17** The assessment baseline of the second biodiversity assessment will be defined by identifying the performance of Ecosystem Services within the relevant NCA. Assessments may also consider the ecological opportunities identified in the NCA.

### **Assessment of impacts to biodiversity features**

**7.18** With regard to the first assessment, biodiversity effects will be assessed firstly in terms of the environmental capital of the biodiversity feature likely to be affected, comprising:

- the susceptibility of the feature to the change being proposed;
- the replaceability of the feature; and
- the importance and value of the feature.

**7.19** And secondly the nature of the effect likely to occur, comprising:

- the magnitude of effects of the airport scheme development, based on the scale of predicted change – this includes consideration of the airports' operations, and therefore the ecological impacts of bird strike, the ecological impacts of noise and safeguarding and the ecological impacts of changes to air quality;
- the duration of the effect; and
- the reversibility of the effect.

**7.20** Any net gains to biodiversity will be captured in this methodology.

**7.21** Professional judgement on the available scientific evidence will be used to provide reasoned and expert opinions on these criteria. Appropriate consideration will be given to receptor pathway links between habitats.

**7.22** The Commission will also be guided by relevant data sources. These include aviation sensitivity maps, produced by Natural England (2013), which identify nationally and internationally designated terrestrial nature conservation sites and protected landscapes that are likely to be sensitive to aviation impacts. The maps identify sites within a range of 0-22 km from airports, depending on the features of interest of the receptor site.

- 7.23** With regard to the second assessment, on Ecosystem Services, impacts will be assessed at a high level in terms of the two key drivers of ecosystem change:
- land use change, resulting from construction of infrastructure (airport and surface access); and
  - hydrological change and pollution, resulting from changes in surface access and air traffic.
- 7.24** The steps involved in defining the impact to Ecosystem Services can be categorized as follows:
- defining the environmental stock (a process which is likely to rely on previously produced high-level habitat maps, such as those created in conjunction with Natural England's work linking National Ecosystem Assessment to broad habitat types);
  - identifying the environmental impact of a scheme to that service;
  - estimating cost or benefit, in terms of the change to the Ecosystem Service at a strategic, qualitative level (the aim is not to undertake an exhaustive assessment, but to identify potential key impacts at a high level); and
  - sensitivity analysis if necessary.

## Datasets

- 7.25** Information on statutory and non-statutory nature conservation sites will be obtained from the following sources:
- Joint Nature Conservation Committee or information on European sites;<sup>23</sup>
  - Information on boundaries and citations for NNRs and SSSIs from Nature on the Map, Natural England;<sup>24</sup>
  - Information on citations for LNRs, Natural England<sup>25</sup> and from local authorities;
  - Aviation Sensitivity Maps (Natural England, 2013);
  - Citations and boundaries for Local Wildlife Sites in London;<sup>26</sup>

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23 <http://www.jncc.gov.uk/page-4>

24 <http://www.magic.gov.uk/>

25 <http://www.english-nature.org.uk/Special/Inr/office.htm>

26 <http://www.lbp.org.uk/biodiversitylondonwildlife.html>

- The GIS Digital Boundary Datasets held by Natural England are available online. These cover all the principal statutory terrestrial nature conservation in the UK as well as some relevant non-statutory data such as Ancient Woodland and priority habitats. GIS data for Local Wildlife Sites can be requested from local authorities or local biological records centres, if relevant.
- Information on National Character Areas (NCAs), biodiversity trends and Ecosystem Services will be obtained from Natural England.<sup>27</sup>
- Information on species will be taken from the Biodiversity Action Reporting System and the National Biodiversity Network Gateway.

## Outputs of the assessment

- 7.26** With regard to the first assessment, impacts on biodiversity features will be captured via the sustainability assessment process.
- 7.27** Costs of environmental mitigations will be captured and assessed. In addition, potential environmental mitigations which fall outside of promoters' central cases will be costed, and an assessment made as to their deliverability.
- 7.28** With regard to the second assessment, impacts on Ecosystem Services will be captured via the sustainability assessment process.
- 7.29** In addition, potential environmental mitigations which fall outside of sponsors' central cases will be costed, and an assessment made as to their deliverability.
- 7.30** Costs and benefits to stated Ecosystem Services can be monetised in line with a broader economic appraisal, and Defra and DfT's WebTAG provide guidance in this regard.

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<sup>27</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/194720/England\\_Natural\\_Environment\\_Indicators.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/194720/England_Natural_Environment_Indicators.pdf)  
<http://www.naturalengland.org.uk/publications/nca/default.aspx>

## 8. Carbon

Objective		<b>To minimise carbon emissions in airport construction and operation.</b>
Business Case		Benefits and costs in relation to the Commission's 'do minimum' are considered in the Economic Case, on a monetised basis where possible.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

### Introduction

- 8.1** Schemes should seek to minimise the carbon emissions associated with construction and with the day-to-day ground operations associated with infrastructure once it has been delivered.
- 8.2** The Commission has taken carbon emissions from flights into account in setting its assessment of need, and the recommendation that one net additional runway is required by 2030 took into account the UK's obligations under the Climate Change Act. Carbon assessments will have their basis in the Commission's assessment of need.
- 8.3** The Commission will keep its assessment of need under review in respect of this issue during Phase 2, particularly in light of any new developments arising from international negotiations on the control of carbon emissions from aviation.
- 8.4** The Commission's *Aviation and Climate Change* Discussion Paper<sup>28</sup> interrogated the climate science relating to aviation and provided an overview of national and international carbon policy frameworks.

## Outline

- 8.5** The net change in carbon emissions resulting from an airport scheme will be assessed relative to baseline carbon emission forecasts.<sup>29</sup> Carbon emissions will be assessed on a national basis.<sup>30</sup> Appropriate sensitivities will be applied to calculations, leading to net changes in carbon being expressed as a range. The assessment period is 60 years.
- 8.6** Carbon emissions will be measured in accordance with HM Government's appraisal guidance produced by the Department for Energy and Climate Change (DECC).<sup>31</sup>
- 8.7** Five areas are identified where carbon emissions may change as a result of an airport scheme:
- increased airport capacity leading to a net change in air travel;
  - departure and arrival route changes through altered flight operations;
  - construction of new facilities and surface access infrastructure;
  - airside ground movements and airport operations; and
  - changes in non-aviation transport patterns brought about by a scheme's surface access strategy i.e. passenger surface access journeys to and from a UK airport; and, where possible, freight journeys.
- 8.8** The Commission expects scheme proposers to build carbon mitigation into their schemes wherever possible, particularly in the construction and operation of new facilities and surface transport. Any additional potential carbon mitigations will also be assessed.
- 8.9** Carbon emissions are the main pollutants assessed for the five areas identified above, quantifying and valuing the impacts. Non-CO<sub>2</sub> impacts are described but are not quantified in this assessment.

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29 DfT UK Aviation Forecasts, January 2013

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/223839/aviation-forecasts.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/223839/aviation-forecasts.pdf)

30 The sources of aviation emissions in DfT's forecasts are: all domestic and international passenger and freighter flights departing within/from UK airports and aircraft on the ground. DfT's UK Aviation Forecasts 2013, Table 6.1

31 DECC Valuation of energy use and greenhouse gas (GHG) emissions, September 2013

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/248603/2013\\_Main\\_Appraisal\\_Guidance\\_-\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/248603/2013_Main_Appraisal_Guidance_-_FINAL.pdf)

## Assessment

- 8.10** The Commission's demand forecasting and assessment of need for additional capacity measure the carbon impact of additional flights to/from and within the UK. The change and rate of change in aviation carbon emissions relative to the baseline demand forecast will be assessed.
- 8.11** Given that these scenarios form the framework of the Commission's assessment of need for additional aviation capacity, the increase in carbon emissions from greater aviation capacity will be approximately similar for the different airport schemes. However, there may be relative differences between airport schemes and surface access strategies in relation to carbon impacts as a result of construction and operational procedures.

### Assessment base cases

#### *Increased airport capacity leading to a net change in air travel*

- 8.12** The 'do minimum' will use carbon emissions from the forecast of UK aviation demand under present-day capacity scenarios, taking into account the limitations to runway and terminal capacity at UK airports (the 'capacity constrained scenario').<sup>32</sup> The 'do-minimum' scenario considers:
- the maximum use of existing infrastructure;
  - infrastructure schemes and changes to airport masterplans that are already in the planning pipeline and are to be delivered by 2020;
  - incremental growth to full potential long-term capacity by 2030;
  - terminal capacity increasing incrementally to service additional runway capacity; and
  - no further changes beyond 2030.<sup>33</sup>
- 8.13** The demand forecast modelling constrains 2050 flight operation emissions to 2005 levels, 37.5 MtCO<sub>2</sub>. This is in line with the Committee on Climate Change's advice in 2012, which suggested an appropriate planning assumption was for UK aviation emissions in 2050 to be around 2005 levels.<sup>34</sup>

32 Further discussion can be found in the Airports Commission's Interim Report and 'Appendix 3: Technical Appendix', December 2013. <https://www.gov.uk/government/publications/airports-commission-interim-report>. This baseline scenario will continue to be progressively updated throughout the lifetime of the Commission.

33 DfT *UK Aviation Forecasts*, January 2013, Chapter 5

34 Committee on Climate Change, in particular the report 'Meeting Carbon Budgets – 2013 Progress Report' to Parliament available at <http://www.theccc.org.uk/publication/2013-progress-report/>

### *Departure and arrival route changes through altered flight operations*

**8.14** The carbon emissions for flight operations are included in DfT's carbon emissions in the forecasts described above.<sup>35</sup>

### *Construction of new facilities*

**8.15** This baseline will identify carbon emissions from current plans for infrastructure development, which are not part of the airport scheme. In addition, the 'do minimum' will consider the nature of the land that might be developed, for example, development of carbon sinks.<sup>36</sup>

### *Airside ground movements and airport operations*

**8.16** This 'do minimum' will identify carbon emissions for airside ground movements and airport operations. This will be derived from airports' current operations.

### *Changes in non-aviation transport patterns*

**8.17** DfT's aviation modelling also comprises the National Air Passenger Allocation Model. Carbon emissions from surface access are not included in DfT's UK Aviation Forecasts publication – however, emissions can be estimated from this model.<sup>37</sup>

## **Assessment detail**

**8.18** The carbon emissions from an airport scheme will be estimated in the five areas identified and compared to the relevant baseline described above.

### *Increased airport capacity leading to a net change in air travel*

**8.19** DfT's UK Aviation Forecasts present how carbon emissions are forecasted, and the assumptions used as part of this forecast.<sup>38</sup> This approach will be used to measure carbon emissions from additional ATMs. This will be supplemented by sensitivity analyses (for example, on technological developments, behavioural change and other assumptions about the future).

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35 In reality, the actual distance flown is likely to be longer than the estimated distance flown ('great circle' distances) due to sub-optimal routeing and stacking at airports during periods of heavy congestion. DfT's modelling of movements applies an adjustment factor to uplift the distance flown by 8%.

36 Information on carbon sinks is provided in the National Character Areas produced by Natural England.

37 The assessment of carbon emissions from surface access transport is estimated here. Whilst the 'Surface Access' appraisal discusses the scheme promoter's surface access strategy in more detail.

38 DfT *UK Aviation Forecasts*, January 2013, Table 3.12 and Table 6.1. See also 3.60-8 and Chapter 6.

*Departure and arrival route changes through altered flight operations*

**8.20** Emissions from circling and delay are calculated using an 8% uplift on flight distance and are included in aviation carbon emissions. Airport-specific changes to flight operations will be modelled to estimate the change in carbon emissions.

*Construction of new facilities and surface access infrastructure*

**8.21** Carbon emissions over the construction period only will be estimated. This includes both on- and off-site emissions, from the construction to the carriage of construction materials. Defra/DECC's GHG Conversion Factors for Company Reporting<sup>39</sup> will be used to inform the carbon emissions factors for the calculations. Some of the emissions (for example, in construction materials) may be embedded emissions.

*Airside ground movements and airport operations*

**8.22** These will be extrapolated from the airport's current ground movements and operations data.

*Changes in non-aviation transport patterns*

**8.23** Where possible, the net change in carbon emissions from surface transport to/from the airport will be quantified. The relevant marginal emissions factors will be used.<sup>40</sup> DfT will provide information on appropriate carbon emission factors for High Speed Rail, classic rail and London Underground lines.

**8.24** Once the net change in carbon emissions for each area identified resulting from a scheme is measured (e.g. in tonnes (tCO<sub>2</sub>e) or million tonnes (MtCO<sub>2</sub>e) of equivalent mass of carbon emissions), these emissions will be given a monetary value using carbon prices published by DECC. The changes in carbon emissions must be mapped to either the traded (EU ETS), or non-traded sector.<sup>41</sup>

39 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/224437/pb13988-emission-factor-methodology-130719.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/224437/pb13988-emission-factor-methodology-130719.pdf)

40 *Ibid.*

41 DECC *Valuation of energy use and greenhouse gas (GHG) emissions*, September 2013, paragraph 3.21-4.

## Outputs of the assessment

**8.25** The assessment of the carbon impacts of an airport scheme will produce:

- the absolute quantity of carbon emissions from the five areas identified above, with splits between the traded and non-traded sectors, where relevant;
- the net change in carbon emissions of the schemes, including their surface access strategies, relative to the appropriate baseline;
- a monetary valuation of the net change in carbon emissions; and
- an assessment of the details of any further carbon mitigation and adaptation measures that may be proposed by scheme promoters.

## 9. Water and flood risk

Objective		<b>To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk.</b>
Business Case		Benefits and costs in relation to the Commission's 'do-minimum' are considered in the Economic Case.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

### Introduction

- 9.1** Airports are large users of water, from servicing aircraft to using water in terminal buildings. And the South East is a particularly water stressed part of the country. Water scarcity is a problem that is likely to become more serious over time due to increasing population, and likely to be compounded by a changing climate.
- 9.2** In addition, the aviation sector presents a particular set of hazards to water quality and the environment, via processes such as the de-icing of aircraft and runways damaging water quality, or water run-off from airports generating flood risks for surrounding environments.
- 9.3** For these reasons, schemes should demonstrate that an airport's water use is carefully integrated into the existing needs and demands of the local environment and that water consumption is sustainable, including in terms of future urbanisation. The Commission is also aware that airports can do much to conserve and manage water efficiently during construction and ongoing operation of an airport, including appropriate mitigations to limit negative impacts on the surrounding environments, and is keen to see these mitigations explored thoroughly in each scheme.

### Outline

- 9.4** The Commission's appraisal will consider the impact of an airport scheme on water quality and quantity, and subsequent impacts, over a 60 year appraisal period.
- 9.5** The impact of an airport scheme on flood risk in the local area will also be assessed.

**9.6** The Commission is mindful that an airport scheme should be developed in line with the Water Framework Directive (WFD). The WFD stipulates three primary commitments:

- to meet legal requirements related to protected areas;
- to ensure that the status of water bodies do not deteriorate; and,
- to look to achieve good status in water bodies.

## Assessment

### Assessment base case

**9.7** The ‘do minimum’ will identify how water quality, quantity and flood risk will develop in the surrounding area in the absence of an airport scheme. This will include potential implications of climate change on water issues over the lifetime of the scheme.

**9.8** The WFD establishes a strategic ‘river basin planning’ approach to managing the water environment, including a common approach to setting environmental objectives for all water bodies across the EU.<sup>42</sup> The Commission believes this approach is fit for purpose as a baseline for its appraisal. Information on the current assessment of water body status in relation to the WFD is available at the Environment Agency’s website within River Basin Management Plans.<sup>43</sup> Information on water resource availability is available from the Environment Agency’s website within Catchment Abstraction Management Plans.<sup>44</sup>

**9.9** In terms of flooding, the base case will be measured using the latest assessments of flood risk for the area surrounding an airport scheme, including using the location of flood risk areas on or near the airport site (if any) by referring to the Environment Agency’s published flood maps.<sup>45</sup> The base case may include potential implications of climate change for flood risk, such as more extreme rainfall events at allocated development sites.

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42 The WFD requires a management plan to be drawn up for every river basin district every 6 years.

43 <http://www.environment-agency.gov.uk/research/planning/33106.aspx>

44 <http://www.environment-agency.gov.uk/business/topics/water/119927.aspx>

45 <http://www.environment-agency.gov.uk/homeandleisure/floods/default.aspx>

## Assessment detail

**9.10** The Commission's appraisal will consider at a high level, the impact of an airport scheme on:

- the water environment in terms of surface waters, ground waters, estuaries and coastal waters (surface waters include streams, rivers, lakes, reservoirs and wetlands);
- the water quality, assessed using the WFD classification system, considering impacts on protected areas, no deterioration of water bodies status and achieving good status in water bodies (this includes ecological and chemical quality);
- water quantity and resources in terms of the availability, reliability, rarity and substitutability, and its implications on local and wider water resource management;
- any significant ecological impacts that may ensue from the above impacts;
- the geographic scale at which the water attribute matters (local, regional, national or global level).
- In addition, a strategic assessment of the potential risk of flooding resulting from an airport development will be carried out i) to ensure the local and wider area are protected from flooding; and ii) to ensure that the development does not displace water or alter water flows, increasing the risk of flooding elsewhere. The Environment Agency and other flood risk management authorities will be consulted on how to manage flood risk in an area.

## Datasets

**9.11** The following datasets can be used for this appraisal:

- National Character Areas, Natural England;<sup>46</sup>
- River Basin Management Plans;
- Catchment Abstraction Management Plans;
- detail on hydrogeology, such as aquifer depth and depth to groundwater, can be manually extracted using the hydro-geological map of different areas obtained from the British Geological Survey;
- lakes, canals and other artificial water-bodies can be identified using the Ordnance Survey raster mapping;

- Natural England's aviation sensitivity maps identify sites within a 5km buffer of UK airports that are likely to be sensitive to water quality issues; and
- water company Water Resource Management Plans

## **Outputs of the assessment**

**9.12** The assessment of the water and flood risk impacts of an airport scheme will produce:

- predicted impacts on the water environment, particularly water quality and water quantity and resources, measured against the defined sustainability objective;
- a flood risk assessment, identifying how flood risk will be managed now and over the development's lifetime, taking climate change into account; and
- an assessment and costing of any credible and potential mitigations that fall outside of scheme promoters' central cases.

# 10. Place

Objective		<b>To minimise impacts on existing landscape character and heritage assets.</b>
Business Case		Benefits and costs in relation to the Commission's 'do minimum' are considered in the Economic Case.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

## Introduction

- 10.1** Schemes will require land to be developed for the airport's operations and potentially for surface access infrastructure. Schemes will also generate increased aviation and surface transport traffic, which will impact on the local landscape and townscape, visual amenities and heritage assets. This will affect the people who benefit from these features. Impacts may be felt particularly on protected landscapes and assets, which are vulnerable to the visual and tranquillity impacts of aviation.
- 10.2** Schemes should therefore demonstrate that, where possible, they have taken all possible steps to minimise and mitigate their impacts upon landscape, townscape, waterscape and heritage assets, including listed buildings. Schemes should be mindful of the landscape and townscape impacts of any urbanisation that might be a consequence of the delivery of new capacity.
- 10.3** Schemes should also seek to identify and, where possible, provide mitigation strategies for the loss of agricultural land and the disposal of waste, which will need to be appropriately removed, transported and disposed.

## Outline

- 10.4** This appraisal will assess the scale, location and type of land that would be developed as part of an airport scheme and its related surface access strategy, and the consequential impacts.
- 10.5** This includes assessments of the impacts on landscape, townscape, waterscapes, heritage assets and other impacts to the character of the local area.
- 10.6** In addition, the waste produced during the construction of an airport, and how this will be managed, will also be assessed.

## Assessment

### Assessment base case

- 10.7** The Commission's base case considers the future of an airport scheme's proposed location in the absence of any airport development, other than that currently planned.
- 10.8** The base case will be based on Natural England's 'National Character Area' publications, which provide profiles of the UK's 159 areas, including their landscape and townscape settings and heritage assets.<sup>47</sup>

### Assessment detail

#### *Development*

- 10.9** The type of land that will be developed will be classified by its land use and cover. This classification can be based on the National Land Use Database (NLUD),<sup>48</sup> which categorises land as follows: agriculture and fisheries, forestry, minerals, recreation and leisure, transport, utilities and infrastructure, residential, community services, retail, industry and business, vacant and derelict, defence and unused land.
- 10.10** Further details on different land use and definitions of land cover can be found in the NLUD. GIS mapping can also be used to understand the type of land surrounding an airport.
- 10.11** The local economic impacts, such as changes to commercial and residential land use and changes to land values, are captured in the Local Economy Impacts module.
- 10.12** The quantity of land, how such land is used and changes in such use, will be identified. The resulting impacts from changing the land use will be assessed, considering the direction and magnitude of the impacts. The Commission is interested in how proposals will mitigate the impact of developing land of high value.

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47 <http://www.naturalengland.org.uk/publications/nca/default.aspx>

48 <https://www.gov.uk/government/publications/national-land-use-database-land-use-and-land-cover-classification>

### *Landscape, townscape and waterscape*

**10.13** Closely related to the assessment of the type of land developed, the landscape, townscape and waterscape affected will include assessing, where appropriate:

- topography/hydrology – the height, form and patterns of the ground and hydrology where appropriate;
- land cover – the pattern of vegetation;
- layout, density and mix of buildings, and their architectural style;
- sense of tranquillity;
- light pollution;
- culture – forms of landscape for culture and human interaction;
- cultural spaces and human interaction; and
- beauty.

**10.14** The assessment will consider the direct impacts (such as, the construction of a new feature on the landscape) and the indirect impacts of how people engage with the feature (such as loss of tranquillity or light pollution).

**10.15** Natural England's Landscape Character Assessment (LCA) guidance and existing local character assessments, including Areas of Outstanding Natural Beauty and National Parks, will be used to articulate landscape character, identifying features which give a locality its 'sense of place' and pinpoint that which differentiates it from neighbouring areas.<sup>49</sup> The 2013 Guidelines for Landscape and Visual Impact Assessment may also be used in the assessment.<sup>50</sup> Additional datasets that are useful for this assessment are listed below.

**10.16** The methodology for assessing impacts on tranquillity from aircraft noise will involve overlaying maps showing flight paths below an altitude of 7,000 feet with the Campaign to Protect Rural England's (CPRE) national tranquillity maps, to illustrate areas where low-flying aircraft impact on landscapes and sites of tranquillity. In a similar manner, light pollution impacts on townscape could be assessed using CPRE's Dark Skies report.<sup>51</sup>

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49 <http://www.naturalengland.org.uk/ourwork/landscape/englands/character/assessment/default.aspx>

50 Guidelines for Landscape and Visual Impact Assessment , 3rd Edition, Landscape Institute and Institute of Environmental Management and Assessment, 2013

51 <http://www.cpre.org.uk/what-we-do/countryside/dark-skies>

## Heritage

**10.17** In terms of historical assets, English Heritage has a range of useful information on historic buildings, landscapes and places, and archaeological remains. The National Heritage List for England is the official, up-to-date database of all nationally designated historic places including:

- listed buildings;
- scheduled monuments;
- protected wreck sites;
- registered parks and gardens;
- registered battlefields;
- World Heritage Sites;
- applications for Certificates of Immunity; and
- current Building Preservation Notices.<sup>52</sup>

**10.18** Relevant Historic Landscape Character information should also be used.<sup>53</sup> In terms of archaeological remains (both visible and invisible), information from English Heritage Archives can be used.

**10.19** CPRE's tranquility maps also identify designated heritage assets located within tranquil areas, highlighting those that may be particularly susceptible to noise intrusion.<sup>54</sup>

**10.20** The assessment will identify the heritage assets affected and how this may impact on culture, considering the scale of the impact.

## Waste

**10.21** The construction phase of an airport scheme will generate substantial waste materials. The Engineering Plans provided by scheme promoters require them to identify a waste management plan, including details of a contamination assessment and how any contaminated elements will be removed, transported and disposed.

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52 <http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/>

53 <http://www.english-heritage.org.uk/professional/research/landscapes-and-areas/characterisation/historic-landscape-character/>

54 <http://www.cpre.org.uk/what-we-do/countryside/tranquil-places/in-depth/item/1688-how-we-mapped-tranquillity>

## Datasets

**10.22** The following datasets can be used for the appraisal:

- National Character Areas, Natural England;
- Landscape Character Assessment, Natural England;
- 2013 Guidelines for Landscape and Visual Impact Assessment;
- National Land Use Database: Land Use and Land Cover Classification, 2006;
- National Heritage List, English Heritage;
- Historic Landscape Characterisation, English Heritage;
- Archaeological landscapes, English Heritage Archives
- Aviation sensitivity maps, Natural England;
- National tranquillity maps, CPRE;
- Geographic Information System (GIS) data and mapping; and
- Ordnance Survey maps.

## Outputs of the assessment

**10.23** The assessment of the impacts of an airport scheme on the local place will produce:

- a range of maps overlaid to build up a picture of impacts on the local and wider area;
- an assessment of the type and quantity of land developed (classified by its use and cover), and the direction and magnitude of the impacts of changing land use;
- an assessment of the landscape, townscape, waterscape and heritage assets affected, considering the scale and importance of the places and features; and,
- an assessment of a scheme's waste management plans, and their potential impacts on environmental or other factors.

# 11. Quality of life

Objective		<b>To maintain and where possible improve the quality of life for local residents and the wider population.</b>
Business Case		Quality of life will be considered in a scheme's Strategic Case. Some factors which affect quality of life, such as noise pollution, will be monetised in a scheme's Economic Case.
Sustainability Assessment		A sustainability assessment will be undertaken against the stated objective.

## Introduction

- 11.1** Many factors contribute to, or detract from, quality of life: personal finance, relationships, people's interaction with their natural environment, to name a few. Some determinants of quality of life are, clearly, more likely to be affected by the expansion of existing airport infrastructure. For local communities airports can have positive impacts in terms of transport connectivity and employment, but also negative impacts in terms of noise, pollution and congestion. For the wider population, access to aviation, whether for business or leisure, can have substantial implications for quality of life.
- 11.2** 'Quality of life' is a difficult concept to define and quantify. However, recent research programs offer helpful ways into this issue. Since 2010 the Office for National Statistics (ONS) has captured data on the subjective wellbeing of the public. A growing body of research has built up around this data, and in the second phase of its work the Commission is interested to explore what analytical opportunities this dataset may present.
- 11.3** Schemes should look at the key, airport-sensitive determinants of quality of life, drawing together the detailed assessments undertaken in other parts of the Framework to provide an overview of the impacts on quality of life. The Commission is interested in seeing how schemes will take an innovative and integrated approach to managing these impacts and balancing the interests of various groups.

## Outline

- 11.4** This assessment will synthesise and summarise the impacts on quality of life captured elsewhere in the Commission's Appraisal Framework. The assessment will consider the impact of a scheme on the quality of life of a range of stakeholder groups in relation to a selection of quality of life indicators.

## Assessment

### Assessment base case

- 11.5** The base case will be defined firstly by selecting which quality of life indicators are most likely to be sensitive to airport development. This will occur with recourse to the Measures of National Wellbeing – a dataset produced by the ONS, which identifies key quality of life indicators across the domains of education and skills, economy, governance, natural environment, relationships, health, 'what we do', 'where we live' and personal finance. This selection will be drawn up in conjunction with the opinions of the Commission's expert panel and other relevant expertise.
- 11.6** Second, the behaviour of these indicators may be tested in relation to a selection of the UK's current airports. For example, if (a) unemployment rates and (b) reporting a long-term illness (both drawn from the Measures of National Well-Being) are selected as indicators that are particularly sensitive to airport development, then the performance of these indicators in relation to the operation of an airport may be tested by examining data held by the ONS on UK airport stakeholders (be they defined by interaction with, geographical proximity to or surface access journey time to the airport).

### Assessment detail

- 11.7** Against this base case, scheme-specific analysis of quality of life indicators will take place.
- 11.8** Factors resulting from an airport or surface access development which may impact upon quality of life are assessed throughout the Phase 2 Appraisal Framework. However, the information can be presented in different formats – impacts can be:
- monetised (for example, changes to noise or carbon emissions); or
  - described quantitatively (for example, the health impacts of a change to air quality); or

- described qualitatively (for example, the importance of preserving the habitat of a priority species, or the impact of a new, audible flight path on a recognised heritage site).
- 11.9** Equally, the Commission is aware that impacts upon determinants of quality of life will be scattered throughout the appraisals, or embedded within analyses, and may therefore be hard to locate.
- 11.10** The aim of this section of the assessment is to present all of the Commission's analysis pertaining to quality of life into one area. The primary intention will be to explain, in a uniform, understandable manner, how an airport proposal may improve or detract from the quality of life of key stakeholder groups.
- 11.11** As a minimum, any quality of life assessment will consider the impacts defined in the noise, air quality, place and community assessments.
- 11.12** Assessment scopes (for example, the temporal and spatial range of assessments) vary throughout the framework. Where feasible, this module groups various data sources into simple, understandable categories, by:
- capturing a snapshot of the impacts of quality of life at construction phase, initial operations phase, and mature operations phase; and
  - summarising quality of life impacts for a range of stakeholders, categorised by themes such as:
    - defined interaction with an airport (e.g. employee, infrequent leisure flyer, frequent business flyer);
    - geographical proximity to the airport (which can be used as a proxy for the type of engagement people are likely to have with an airport), for example, under 5 miles, under 10 miles, under 20 miles and under 50 miles; and
    - surface access journey time proximity to the airport (which can be used as a proxy for the type of engagement people are likely to have with an airport), for example, at less than 30 minutes, less than one hour, less than two hours and less than four hours.
- 11.13** Whilst assessment outputs are defined for individual topic areas throughout this Framework, it may also be possible to use the outputs of the Commission's assessment in the light of specific quality of life assessment methodologies, such as those identified in the HM Treasury Green Book. The Commission understands that this guidance will be updated imminently.

**11.14** Further to the above, in order to define an overall quality of life, subjective wellbeing impact data drawn from the Annual Population Survey may be used. This data could be considered in its own right, in relation to the stakeholder groups identified above. Additionally, relationships could be defined between subjective wellbeing scores and the individual quality of life indicators. In this manner, subjective wellbeing data could be used as a common currency to determine the relative impacts of different wellbeing indicators.

## Datasets

**11.15** The following datasets can be used in this appraisal:

- HM Treasury Green Book<sup>55</sup>
- Office of National Statistics, Measuring National Wellbeing, Domains and Measures, September 2013<sup>56</sup>
- Annual Population Survey

## Outputs of the assessment

**11.16** Assessment outputs will include a summary of a scheme's holistic impacts on quality of life.

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55 <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government>

56 <http://www.ons.gov.uk/ons/guide-method/user-guidance/well-being/index.html>

# 12. Community

Objectives		<b>To manage and reduce the effects of housing loss on local communities;</b> and <b>To reduce or avoid disproportionate impacts on any social group.</b>
Business Case	✓	Community impacts will be considered in a scheme’s Strategic Case. Some factors which affect the local community, such as noise and air pollution, will be considered in a scheme’s Economic Case.
Sustainability Assessment	✓	A sustainability assessment will be undertaken against the stated objectives.

## Introduction

- 12.1** The demolition of homes is a serious but generally unavoidable consequence of airport expansion. The Commission requires proposers to demonstrate that they have minimised these impacts so far as possible (and the Commission took this into account in reaching its shortlist of proposals in the *Interim Report*).
- 12.2** Where the demolition of homes is required, the Commission will examine the community impacts of this, including the potential for severing existing communities and the consequent implications for loss of community cohesion and reduced quality of life.
- 12.3** The Commission wishes to examine how these impacts can be minimised. The Commission will also examine any consequent need for new housing construction, either to compensate for lost housing or to respond to urbanisation in the vicinity of the proposal, and how the impacts of this upon existing communities can be managed.
- 12.4** The Commission is conscious that it would be inappropriate and potentially unlawful for a scheme to have an unduly adverse or disproportionate impact upon any particular social group, including vulnerable groups. Schemes will therefore be subject to an equalities screening, producing materials that would support a full Equalities Impact Assessment should one be deemed necessary.

- 12.5** The development of an airport is likely to affect the structure and distinctiveness of the local community. This appraisal will determine how the airport scheme and its related surface access strategy impacts on the integrity, culture and structure of the local community surrounding the airport under consideration. The Commission will assess the effectiveness of the scheme's measures to mitigate potential negative effects, as well as proposed positive actions to enhance equality outcomes.
- 12.6** This appraisal will provide a qualitative assessment of the impact of airport expansion on the local community, exploring how potential changes will affect the everyday lives of local residents.

## Outline

- 12.7** This assessment covers the impact of an airport scheme and the surface access strategy on the local community. It will provide a snapshot of the potential impacts on the local community at construction phase, initial operations phase, and mature operations phase.
- 12.8** A 'local community profile', predicting changes to the current community profile, will be created for each airport scheme. This profile will identify households at risk of isolation, severance and diminished access, as well as impacts on community identity. This analysis will in turn inform an equalities screening exercise.
- 12.9** This module overlaps with other appraisals. Changes in the local area are analysed in detail in the Local Economy Impacts module, such as identifying the quantity of housing to be built or demolished and employment and services created or lost. Other impacts on local communities may include noise and air quality changes and the extent of local support for a scheme. These are discussed under the relevant topic.

## Assessment

### Assessment base case

- 12.10** The Commission's 'do minimum' option will depict the current environment in the local community surrounding the airport. The baseline will provide a brief assessment of the local community historically, currently and how it is anticipated to evolve in the future, without the proposed airport development.

**12.11** This will be informed by information from the Index of Multiple Deprivation (IMD), a published dataset, that categorises local authorities in England in terms of their levels of deprivation, combining a number of indicators that cover a range of economic, social and housing issues.<sup>57</sup>

**12.12** In addition, some of the measures of the national wellbeing dataset produced by the ONS will be used, where local level statistics are available, focusing on the 'Where We Live' data.<sup>58</sup> For example:

- crime against the person;
- safety when walking home alone after dark;
- has the population accessed the natural environment at least once a week in the last 12 months;
- sense of belonging to the neighbourhood; and
- satisfaction with accommodation in the neighbourhood.

## Assessment detail

**12.13** The assessment will create a 'local community profile', extrapolating from local level ONS and IMD data, and drawing up a qualitative analysis. It will map the proposed airport scheme on to the local community area, identifying what will change; and it will assess the likely impacts (both positive and negative) and who in the community is most likely to be affected.

### Severance

**12.14** A high-level severance assessment will be undertaken, which will examine barriers and opportunities that an airport development may create in the local community, which prevent or enhance access to property, employment, community facilities, amenities and services. The assessment will consider the equity distribution and fairness of severance impacts, such as:

- direct loss of property, job and/or community facilities,
- increased pressure on housing, employment and facilities, and
- loss of amenity or increased travel time related to re-provision or severance.

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57 <https://www.gov.uk/government/publications/english-indices-of-deprivation-2010>

58 <http://www.ons.gov.uk/ons/guide-method/user-guidance/well-being/index.html>

### *Community facilities*

**12.15** The local community profile will examine the location of important community facilities, including GP surgeries, community centres, village halls, schools and educational facilities, local shops, churches and places of worship, parks, playgrounds and sport centres, and transport (public and pedestrian circulation routes). GIS mapping may be used to plot these community facilities, their catchment areas and locations of concentrations of potentially vulnerable groups.

### **Datasets**

**12.16** The following datasets can be used for this appraisal:

- Index of Multiple Deprivation, DCLG;<sup>59</sup> and
- National Well-being data, ONS.<sup>60</sup>

### **Outputs of the assessment**

**12.17** The assessment of the impacts of an airport scheme on the local community will produce:

- a local community profile;
- GIS mapping of the facilities in the local area; and,
- a high-level, qualitative review of households whose situation may change in relation to risk of isolation, severance, diminished access and equality issues.

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59 <https://www.gov.uk/government/collections/english-indices-of-deprivation>

60 <http://www.ons.gov.uk/ons/guide-method/user-guidance/well-being/index.html>

# 13. Cost and commercial viability

Objective		<b>To be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users.</b>
Business Case		Benefits and costs in relation to a scheme's base case are considered in the Economic Case, on a monetised basis where possible. Assessment of commercial viability will be located in the Financial Case and the Commercial Case.
Sustainability Assessment	N/A	

## Introduction

- 13.1** The Commission will consider whether once the full costs of schemes, including surface transport, are taken into account, a degree of public funding may be appropriate. The Commission would, however, wish to be assured that any public expenditure required to deliver proposals would represent value for money for the taxpayer.
- 13.2** In order to assess the value offered by schemes, the Commission requires a clear understanding of their costs and how they might credibly be financed. The Commission will make an assessment not only of the costs associated with infrastructure construction, but also of longer-term operating costs, including impacts upon other Government revenue and subsidy streams. In assessing value for money, the Commission will consider a full range of social and environmental factors, as well as economic issues.
- 13.3** To ensure a balance between the needs of infrastructure investors and airport users, such that wider benefits are realised, the Commission will need to be assured that proposals are financeable. In making its assessment in this area, the Commission will examine whether those areas of the proposal which are to be financed privately might credibly provide a reasonable return on investment for infrastructure investments.

- 13.4** The Commission will further examine the likely aero charges associated with any infrastructure investment and how these might influence airline behaviours. The Commission will require to be assured that aero charges would be set at a level that would be consistent with the efficient use of any new airport infrastructure and the consequent generation of wider economic and social benefits.

## Outline

- 13.5** The cost and commercial viability of proposals will be of direct relevance to their assessment during Phase 2. The Commission will need to reach an assessment of the overall cost of delivering each proposal, including consequent elements such as surface transport provision. Within that overall cost, the Commission will further seek to identify the elements which would most effectively be delivered by private finance and any elements that would require public funding.
- 13.6** In examining the likely private-sector funded component of proposals, the Commission will consider whether the scheme can plausibly be delivered through a workable commercial deal or deals, without compromising the wider economic benefits expected of schemes. This will require the Commission to examine questions relating to the financing and ownership of assets, the allocation of risk and accounting treatments. It will also require the Commission to examine the question of the likely aero charges associated with new runway infrastructure and whether these are consistent with the efficient use of the asset and the generation of wider economic benefits. As new airport infrastructure in London and the South East could possess substantial market power, the Commission will examine whether the proposed financing structure would reflect the requirements of the users of air transport.
- 13.7** In assessing any public finance element necessary to deliver schemes, the Commission will identify those elements of proposals which would not plausibly be included within any private sector finance package. The Commission will identify options for the likely nature and scale of any Government support required, including direct investment, debt guarantees, ongoing operating costs and impacts upon wider Government revenue and subsidy streams.
- 13.8** Schemes will be assessed in terms of the likely value for money of any public funding required and in terms of the likelihood that there is a viable commercial proposition for privately funded elements of the scheme, which reflects the needs of infrastructure investors and users of aviation, thus ensuring that wider economic benefits anticipated from the scheme can be achieved. As part of its final report, the Commission will give an indication of the overall level and timing of public funding

support required for proposals, to enable Government to reach a view on whether they are affordable within the wider context of public finances.

**13.9** This module will draw upon outputs from other appraisal modules, chiefly but not exclusively the Surface Transport module, in order to allow for a comprehensive estimate of the costs associated with each proposal.

**13.10** The components of this module will be:

- Determination of the overall cost options of a scheme (taking into account all elements of updated scheme design).
- Determination of those elements of the proposal which are most appropriate for private financing and those which would require some form of public funding.
- In respect of privately funded components, determination of the scale of private investment required and the conditions needed to make this a desirable proposition for infrastructure investors.
- Determination of the implication of these considerations for aeronautical charges and the likely response to these charges of users of aviation.
- Consideration of whether, in light of the above, the likely demand for use of the new airport infrastructure is consistent with the generation of wider economic benefits.
- Consideration of whether, taking all of the above into account, a commercial entity exists or is likely to exist which would be interested in and able to deliver the privately financed aspects of the proposal.
- Consideration of the likely nature of such an entity, including its accounting treatment.
- Determination of the risks and uncertainties regarding the private sector funded elements of proposals, including the credibility of underpinning assumptions regarding charges to airlines and single-till income.
- Determination of the overall level and timetable of public funding required to deliver the proposal, including wider costs such as surface transport, environmental compensation and other associated infrastructure provision. Determination to include (but not to be limited to):
  - direct capital funding;
  - debt guarantee;
  - ongoing operational costs;

- impacts upon wider Government subsidy and revenue schemes (such as rail franchises).
- Determination of whether the above can plausibly be delivered in line with European rules regarding state aid.
- Determination of any wider costs or benefits associated with elements of the proposal which might impact upon assessment.
- Determination (considering all of the above) of the risk that exists around the overall cost of the proposal.
- Creation of an outline financial model for the private sector elements of the proposal, including an integrated profit and loss, cash-flow and balance sheet, with supporting materials providing a clear explanation of assumptions made.
- Creation of an indicative year by year breakdown of the impact of a proposal upon public accounts.
- Consideration of the impact of a proposal upon the wider market for air transport services, including the response of domestic and international rivals, and the consequent implications for the cost of access to air travel.

## Assessment

### Assessment base case

**13.11** The assessment will take as its base case the Commission's 'do minimum' scenario in which no additional airport capacity is provided.

### Assessment detail

**13.12** The cost and commercial viability assessment will be made within the following constraints:

- That the airport's charges to airlines will need to be set at a level that generates sufficient usage to support wider economic benefits.
- That assumptions regarding other charges (e.g. parking charges and surface transport fares) are credible and compatible with the usage of the airport in a manner that supports wider economic benefits.
- That public investment should represent value for money for the taxpayer.

**13.13** The appraisal will take into account the following:

- The construction costs associated with airport infrastructure.
- The cost of purchasing any land or infrastructure required, either for infrastructure construction or to enable the purchase of other airports for closure (where this is identified as necessary by the commercial viability assessment).
- The cost of operating and maintaining the airport infrastructure over the appraisal period.
- The cost of providing surface transport infrastructure and services, as determined by the surface transport assessment.
- The cost of compensating for any environmental or community impacts of the proposal, as identified by the various assessment modules under the environment and community assessment categories.
- The proportion of costs to be met by the public sector and the impact of these costs on public sector budgets and accounts.
- The cost of any subsidies that may be required to ensure the overall commercial viability of the proposal.
- The degree of uncertainty surrounding each of the above and the consequent need to make adjustments for risk and/or optimism bias.
- The legal framework governing Government subsidies.

**13.14** The Phase 2 assessment will also seek to define the likely commercial background and structure of parties who might be involved in the planning, delivery and eventual operation of planned infrastructure investment.

**13.15** As part of this appraisal, an outline financial model, including an integrated profit and loss, cash flow, and balance sheet, will be produced for each scheme. Assumptions should be clearly stated and, where possible, should be evidenced by comparison to the delivery of other infrastructure projects. This will allow for an assessment to be made of whether the assumptions in this area are credible.

**13.16** Using a similar approach, the Commission will also produce an indication of the year by year implications of each proposal for public accounts.

**13.17** These will play an important role in informing the Business Case which the Commission develops for each proposal.

## Datasets and modelling

**13.18** The following datasets and models can be used:

- Proposer estimates of scheme costs;
- DfT aviation model;
- DfT rail funding model;
- OBR growth forecasts;
- Other (e.g. OECD) forecasts of UK economic growth;
- DfT WebTAG;
- CAA documentation on economic regulation;
- PLANET surface access model for surface transport costs to users;
- DfT National Transport Model;
- OGC guidance on Business Case Appraisal; and
- WebTAG general and aviation modules.

## Outputs of the assessment

**13.19** For each proposal, the Commission seeks options of procurement and financing scenarios, with a recommendation of the 'most plausible', supported by a financial model and including:

- charges to airlines/passengers and impacts upon the airline market (expressed in terms of demand for capacity at the proposal, domestic UK alternative airports and other major European airports);
- nature of any taxpayer support that may be required and implications for balance sheet treatment;
- the degree of uncertainty related to each of the key modelling assumptions and the risk of significant variation over time stemming from this;
- the degree of overall risk that surrounds that 'most plausible' scenario;
- identification of the nature of any related taxpayer support required (e.g. surface access funding);

- any relevant evidence of deliverability based on the procurement and funding arrangements for other infrastructure proposals;
- for each scheme, an indicative Government spending plan, breaking down on a year by year basis the levels of capital and operational expenditure and the impacts on wider Government costs and revenues;
- an indication of the risks surrounding the assumptions in this spending plan and any additional allowance for this that should be made in cost estimates;
- an assessment of whether this spending plan could be made compatible with domestic and European law; and
- an assessment of whether the Government expenditure required would represent value for money.

# 14. Operational efficiency

Objectives		<b>To ensure individual airport and airports system efficiency;</b> <b>To build flexibility into scheme designs;</b> and <b>To meet industry safety and security standards.</b>
Business Case		Benefits and costs in relation to the Commission’s ‘do minimum’ are considered in the Management Case and the Economic Case, on a monetised basis where possible. Assessment of operational efficiency is also directly relevant to the Financial Case and the Commercial Case.
Sustainability Assessment	N/A	

## Introduction

**14.1** The Operational Efficiency of airport schemes will be assessed by considering schemes’ airport master plans and their related surface access plans. The Commission will wish to be assured that:

- proposals can be delivered in a way that does not unduly affect other parts of the system, to the extent that capacity reductions at other airports mean that proposals are no longer compatible with the Commission’s assessment of need;
- the airspace structures required to support proposals are likely to be resilient to disruption;
- proposed schemes are able to incorporate a degree of operational flexibility, so as to be able to accommodate a range of scenarios for the future of the aviation industry; and
- proposals are deliverable within domestic and international safety and security standards.

## Outline

**14.2** Phase 1 of the Commission’s assessment considered the operational efficiency of proposals by testing their assumptions of additional net runway capacity. This

included considering the impact of proposals on other airports including the existence of any airspace interactions and the implications of these on overall capacity across the London airport system.

**14.3** Scheme resilience, reliability and efficiency were assessed by considering the assumptions made on runway utilisation; the efficiency of airfield designs including the ease with which customers could transfer between terminal buildings; and finally, the possible configuration of runways including whether they will operate independently and their mode of operation – either in mixed or segregated mode.

**14.4** Proposals were considered to ensure they complied with existing safety requirements; the proposal’s scalability and the impact on current and future airspace structures were also tested.

**14.5** In Phase 2, the appraisal of operational efficiency will be undertaken in more detail; through the assessment of airport master plans and related surface access plans to ensure the proposed airfield designs, plans and modes of operation are operationally viable. This will consider the plans’:

- capacity;
- safety and security;
- efficiency;
- reliability and resilience;
- scalability; and
- impact on existing or planned airspace structures.

## Assessment

### Assessment base case

**14.6** The assessment base case is the Commission’s ‘do minimum’ scenario.

### Assessment detail

**14.7** In Phase 2, the appraisal of operational efficiency will be assessed in the following ways.

#### *Capacity*

**14.8** Schemes’ assumptions of annual ATMs will be tested to ensure they are realistic considering airfield designs (stand and terminal capacity, runway configuration, mode of operation, and airside ground layout e.g. the location of rapid access taxiways, runway crossing points, among others). The forecast usage will be tested

to ensure that operations can be sustained in a resilient manner. The scheme's ability to cater for a range of airline clients will also be considered, for example, whether the requirements of low cost carriers are supported in scheme designs. The net impact on the capacity of the wider London airport system will also be considered as part of this.

### *Safety and security*

- 14.9** Airport designs will be considered against relevant safety and security standards, including those dictated by the DfT, the CAA and where applicable, ICAO, the European Commission and the European Aviation Safety Agency. All aerodromes and associated air traffic control provisions are expected to meet these standards if they are to be allowed to operate.
- 14.10** The Commission will consult CAA aerodrome guidance, including CAP 791 and CAP 168, to assess scheme proposals but recognises that, with a substantial period of time until new infrastructure is delivered, there is a window during which standards may evolve to reflect technological and operational progress. The Commission is interested in how this might impact upon proposals. The extent of changes to or new Public Safety Zones and any 1 in 10,000 individual risk contours will also be assessed.
- 14.11** Whether proposals will require airspace change will also be considered to ensure airspace changes are not detrimental to safe operations for both the airport scheme and for other airports in close proximity.

### *Efficiency*

- 14.12** The operational efficiency of the airfield designs will be considered by testing the feasibility of the airport infrastructure in supporting schemes' forecasts for expected ATMs. This will consider the likely future fleet mix, the runway configuration proposed – including whether it will support independent runways – landing systems, the airside ground layout proposed including stand and terminal capacity and location, and the capability of the airport scheme to support different modes of operation including segregated and mixed mode.

### *Reliability and resilience*

- 14.13** The reliability and resilience of airport schemes will consider the forecast utilisation of runways and other infrastructure, such as stands and terminals, and whether this utilisation will allow for resilient operations. This assessment will also consider the ability of scheme designs to offer 'reliable' passenger connections by assessing whether terminal and stand configurations support acceptable transfer times for passengers and airlines.

**14.14** The scheme's resilience in the face of severe weather, e.g. low visibility, will also be considered, particularly in respect of the operational provisions which have been made to mitigate against these impacts. For example, if the proposal is located in an area that has historically experienced high levels of fog, flooding or strong winds, mitigation plans will be considered in dealing with this.

### *Scalability*

**14.15** The Commission will examine whether schemes are compatible with a range of scenarios regarding fleet mix (for example, testing compatibility with different mixes of ultra wide-bodied aircraft) to support new commercial models the airport may wish to pursue, and potential changes in operating mode or airfield requirements particularly if further additional runways are considered necessary in the future to meet future demand for aviation. The Commission will also examine compatibility with different mixes of hub and point-to-point traffic, low cost carrier traffic and mixes of long and short haul traffic.

**14.16** The Commission does not intend to test schemes for compatibility with more experimental technological, such as blended-wing aircraft and scramjets, recognising that these technologies may require major changes to airport infrastructure design and that their adoption is by no means certain.

### *Airspace*

**14.17** Airspace implications will be considered by the Commission as part of scheme assessments to ensure safe operations can be sustained. This will include considering the:

- airspace interactions between the proposed scheme and other airports;
- whether efficient flight paths exist to and from the airport in question;
- the facilitation of routes, approaches and departures to mitigate noise impacts;
- the integration of the airport proposal's lower airspace into medium and upper airspace;
- the integration of the airport proposal with the European airspace network; and
- whether the proposal is consistent with the principles of the Single European Sky.

**14.18** Surface Access – This assessment will also consider the operational efficiency of a proposer's surface access strategy:<sup>61</sup>

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61 The range of impacts resulting from the infrastructure and operations of surface access strategies are summarised in the Surface Access module.

- Reliability and resilience of all surface access transport modes, public and private. This will consider multiple methods to access the airport to avoid a single point of failure and to ease points of strain.
- Scalability to understand how the surface access transport to/from the airport will operate if the airport changes its operations and if future fleet mix changes mean that aeroplanes can carry more passengers.
- Passenger throughput at an airport, particularly at peak times, to assess how well the surface access and airport infrastructure and operation work together.
- Congestion and delays on all surface access modes of transport.
- Interface with airport terminals to develop configurations of surface access arrivals/departures to enable ease of access to/from the airport terminal.

## Datasets

**14.19** The following datasets can be used for the appraisal:

- airport masterplans, providing details of airfield designs and planned modes of operation, including planned airspace requirements;
- forecasts for annual ATMs for the proposal and the forecast utilisation of the proposal;
- forecasts of changes to fleet mix and the scalability of airport proposals to meet any significant changes;
- plans for possible future expansion; and
- DfT National Transport Model and other surface transport models.

## Outputs of the assessment

**14.20** For each proposal, an assessment will be produced of how the scheme design will ensure the efficiency, reliability and resilience of operations, identifying any risks and mitigations.

**14.21** An assessment will be made of the expected capacity utilisation for each proposal including assumptions made on the net additional capacity and projected fleet mix changes. This should also include an understanding of the assumptions used as to the mode of operations that will be adopted.

**14.22** Finally, forecast passenger throughput in the airport and the expected surface access provision will be estimated.

# 15. Operational risk

Objective		<b>To enhance individual airport and airports system resilience.</b>
Business Case		Benefits and costs in relation to the Commission's 'do minimum' will be assessed in a scheme's Management Case and Strategic Case.
Sustainability Assessment	N/A	

## Introduction

- 15.1** The Commission is conscious of the need for airport infrastructure to prove resilient. The Commission therefore intends to examine the ability of proposals to adapt both to lower level disruption arising in the course of day-to-day operations and to major disruptive events.
- 15.2** The Commission recognises that each airport scheme will have different resilience risks, depending in part on their geographical location. This assessment aims to understand the inherent risk profile of each airport, but also to understand how each airport plans to minimise the risk of, and quickly adapt to, disruptive events. Major disruptive events may include (but are not limited to) flooding, accidents, severely adverse weather and terrorism. The Commission will consider airport resilience both on a site-specific basis and across the entire South East system.
- 15.3** The risk and impact of airfield and airspace accidents (including bird strike) will be considered as part of the safety assessment undertaken in the operational efficiency appraisal. Due to the long lifespan of the infrastructure, the operational risk module will also consider the adaptability and resilience of airport schemes in the context of climate change.<sup>62</sup>

62 [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/61342/natural-hazards-infrastructure.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61342/natural-hazards-infrastructure.pdf)

## Outline

**15.4** In the Phase 2 appraisal of operational risk, the inherent risk to airport operations of the following disruptive events, among others, will be captured:

- flooding;
- power outages;
- reduced fuel supplies;
- terrorism attacks;
- extreme weather events (including volcanic ash); and
- adaptability to climate change.

**15.5** The capability of schemes to prevent, absorb, adapt to, and recover from these risks will then be assessed. A residual risk will be calculated for each disruptive event in relation to each scheme.

**15.6** Impacts will be categorised at a local, regional and national level.

**15.7** Additional mitigation strategies which fall outside of central scheme designs will be documented, and post-mitigation impacts will be defined for these strategies. Additional mitigations will be costed and the achievability of suggested mitigations assessed.

**15.8** In addition to considering the impacts of disruptive events upon airport schemes, assessments will consider, at a strategic level, whether airport schemes and their proposed mitigations could worsen the impact of disruptive events for surrounding areas and industries (for example, a utilities strategy aimed at mitigating the risk of power outages causing difficulties or adding cost to the energy plans of a local area).

## Assessment

### Assessment base case

**15.9** The inherent risk profile of disruptive events will be calculated in relation to the latest assessments undertaken in the locality of airport schemes (for example, the latest flood risk assessments for each area).

## Assessment detail

- 15.10** In most instances, assessments will be undertaken on a qualitative basis, using expert judgement which takes account of relevant factors and datasets, such as those associated with strategic flood assessments.
- 15.11** For risks associated with power outages and reduced fuel supplies, the airport's ease of access to fuel will be considered at a strategic level, in relation to the National Grid, UK refineries and associated infrastructure.
- 15.12** The Meteorological Office will be consulted with respect to weather forecasting and historical data for airport sites.

### *Climate change adaptability*

- 15.13** Assessments will consider the consequences of a range of potential changes in the climate during the lifetime of the scheme, taking account of the UK climate projections.<sup>63</sup> This should include an assessment of the potential physical impacts of climate change upon all of the above listed risks, and the future airport system's capability to anticipate, absorb, adapt to and/or rapidly recover from these changed risks.
- 15.14** Proposers should consider the Climate Change adaptability of their airport scheme within the context of the adaptation reporting power under the Climate Change Act 2008, which asks organisations, such as strategic airports, to report on risks to them from climate change and how they plan to respond.

### *National Risk Register*

- 15.15** In addition to the above-listed disruptive events, assessments will consider the resilience of schemes against the full range of risks listed in the National Risk Register.

### *Multiple risks*

- 15.16** Disruptive events do not necessarily occur in isolation and assessments will therefore consider how an airport will manage multiple disruptive events occurring simultaneously.

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63 <http://ukclimateprojections.defra.gov.uk/>

## Datasets

**15.17** The following datasets can be used:

- airport masterplans, providing details of airfield designs and planned modes of operation, including planned airspace requirements;
- forecasts for annual ATMs for the proposal and the forecast utilisation of the proposal;
- environment Agency flood maps;
- national and local flood risk management strategies;
- proposer submitted engineering plans, in particular the energy and utility and geo-environmental elements;
- UK climate projections; and
- the National Risk Register.

## Outputs of the assessment

**15.18** An assessment of the key risks and mitigations per proposal.

# 16. Delivery

Objectives		<b>To have the equivalent overall capacity of one new runway operational by 2030; and To actively engage local groups in scheme progression, design and management.</b>
Business Case		Benefits and costs in relation to the Commission's 'do minimum' will be assessed in a scheme's Strategic Case and Management Case.
Sustainability Assessment	N/A	

## Introduction

**16.1** The delivery of new infrastructure, whether airport infrastructure or surface access improvements, has inherent risk. These risks can be attributed to:

- (a) the planning and construction phase, when risks may be amplified if novel approaches have been proposed;
- (b) the delivering phase, where the level of local and community support for the scheme has the potential to delay; and,
- (c) the transition stage, where arguably some of the biggest risks can arise.

**16.2** The Commission's Assessment of Need has identified 2030 as the point by which one net new additional runway is required to prevent significant economic costs arising from capacity constraints. It is therefore important that schemes can demonstrate they are deliverable by this date. The Commission will examine this issue, including any risks associated with delivery.

**16.3** The Commission believes that it is important for local communities most affected by airport development to be properly engaged and consulted. The Commission wishes to examine how scheme promoters intend to manage their engagement with communities throughout the lifespan of the proposed project, including the period after any new infrastructure is delivered.

*The Commission is aware of approaches taken in other countries to ensure the active engagement of local community groups in the development of airports.*

*At Schiphol Airport in the Netherlands, the 'Alderstafel' is a consultative forum attended by the aviation sector, central government, regional and local authorities and residents. The round table was set up in December 2006 to advise the Government on the balance between the growth of the airport, noise reduction and the quality of the local environment in the short (to 2010) and medium (to 2020) term, building consensus amongst the diverse membership of the group to deliver recommendations which balance national strategic objectives with local and regional concerns.*

*The Commission is interested in whether similarly broad and effective Governance arrangements can be established by scheme promoters in relation to the design, development and implementation of their proposals.*

## Outline

- 16.4** Phase 1 of the Commission's assessment has considered the delivery timescales put forward by scheme promoters, challenging them where necessary. The commercial deliverability of schemes was also assessed including through the assessment of approaches to financing new infrastructure. This will be assessed further as part of Phase 2 with regard to the detail set out in the Cost and Commercial Viability module.
- 16.5** In Phase 2, the delivery assessment of schemes will be undertaken with regard to the:
- risks associated with the planning and construction phase;
  - level of public engagement with the scheme; and
  - transition from current operations to the future situation once the new scheme becomes operational.
- 16.6** The assessment will consider both the airport infrastructure and any associated surface access improvements required to support the scheme.

## Assessment

### Assessment base case

- 16.7** The assessment base case is the Commission's 'do minimum' scenario.

## Assessment detail

- 16.8** In Phase 2, the delivery risks of schemes will be considered in the following ways:
- 16.9** Planning and construction phase – scheme promoters’ assumptions regarding the likely timetable, engineering requirements, constraints and impacts for construction of both the airport and surface access infrastructure will be tested to ensure the realism of the timetable and approach proposed. This will include consideration of key dependencies on the effective delivery of scheme proposals, such as the requirement to undertake airspace redesigns, the delivery of surface access, the requirement to alter other airports’ characteristics and/or capacity, and the time required and complexity of detailed safety cases to underpin the new airport’s operations (particularly if there are novel approaches to delivery). The risks of delay arising from other assessments, such as the environmental assessments, will also be considered as part of this work.
- 16.10** Public engagement – this assessment will consider the key risks associated with delivery arising from the level of local and community support for the scheme. Scheme promoters should set out their plans for engagement with local groups in the following three spheres: politics, industry and community, ensuring their views have been listened to and considered as far as possible as part of the evolution of the scheme design. Associated with this, scheme promoters should consider the shape and structure of airport expansion, such as through the planning of noise compensation schemes.
- 16.11** Transition – this assessment will consider the risks associated with transition and the approach to mitigating them. The assessment will also consider the sequencing of events and key dependencies on the effective transition from current operations to the future operations of the new airport infrastructure, ensuring that any impacts during transition are captured and mitigated. Any impacts on other airports in the London airport system will need to be properly understood and considered as part of the transition assessment, including any requirements to close or reduce the capacity of other airports.
- 16.12** Surface access – this assessment will also consider the effective delivery of schemes’ surface access strategies.<sup>64</sup> In particular, this assessment will consider the planning, transition and delivery risks associated with surface access requirements.

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64 The range of impacts resulting from the infrastructure and operations of surface access strategies are summarised in the Surface Access module.

## Datasets

**16.13** This assessment will consider each schemes' design cutting across the following key aspects:

- Airport masterplans – to assess the deliverability of promoters' schemes including the level of complexity and therefore timetable for safety cases;
- Engineering plans – to assess the level of risk inherent in promoters' scheme designs as well as their feasibility;
- Mitigation strategies – to ensure that the delivery risks have been accounted for; and
- Development strategies – to ensure that the approach to project management set out in this strategy captures the key risks identified and that all key dependencies have been taken into account and managed appropriately.

**16.14** A variety of data sources will be used to consider scheme's surface access strategies by the Commission. This assessment will draw on a range of data provided by the airport themselves, DfT's modelling inputs, the Highways Agency, Network Rail, and Train Operating Companies.

## Outputs of the assessment

**16.15** The following outputs are expected:

- For each proposal, an assessment of the risks and mitigation strategies associated with the approach to the planning and construction phase; the public engagement risks; and those associated with transition.
- Evidence of sustained and meaningful engagement with local and community stakeholders including highlighting any changes of features of scheme designs arising as a result of this engagement.
- The Commission does not require scheme promoters to undertake a formal consultation. The Commission's national consultation in the autumn of 2014 will provide opportunity for all local and national groups to voice their opinion on the short-listed schemes, and on the Commission's appraisal of them.
- A plan for the transition between 'as is' and future operations including setting out any interactions with other organisations or airports that will need to be considered.

# Appendix B: Components of updated scheme design (including possible structure)

- 1.** The Commission invites scheme promoters to submit an updated scheme design. This updated design will be a development of the specific option short-listed by the Commission.
- 2.** The Commission would encourage promoters to seek creative and innovative means of meeting these objectives. Given the long timescales for delivering and operating any new infrastructure there is likely to be significant development in technology, operational practice and the regulatory environment with regard to both the aviation industry and the wider user community. Promoters should give consideration to future technologies and practices that may affect their scheme and its performance in relation to the objectives. It is important for the Commission to know ‘what is new’ about each scheme, especially in relation to global best practice or state of the art design.
- 3.** Scheme promoters may find it helpful to present their updated scheme designs in terms of the following elements, which should provide the flexibility to address all of the objectives:

## Strategic argument

*Why a scheme is well-placed to address the UK’s future aviation capacity and connectivity needs, and how it may support the socio-economic development of local areas, regions and the UK as a whole.*

## Objectives

- 4.** Scheme promoters’ submissions should consider, but not be limited to, the following objectives:

Objective	Phase 2 appraisal module
To provide additional capacity and connectivity in line with the assessment of need.	Strategic Fit
To improve the experience of passengers and other users of aviation.	
To maximise wider economic benefits and support the competitiveness of the UK economy.	Economy Impacts
To promote employment and economic growth in the local area and surrounding region.	Local Economy Impacts

### *The future of aviation in the UK and internationally*

5. The Commission's assessment of the most credible options for enhancing aviation capacity over the long-term has been informed by its recommendations on the nature, scale and timing of the UK's aviation capacity and connectivity needs, as set out in its *Interim Report* (Chapters 2-4).
6. Scheme promoters should establish how their scheme is consistent with the Commission's assessment of these needs. This may include information on, for example, the number and type of additional flights that the scheme could support, and the scope for the scheme to facilitate the development of new routes.
7. In addition, scheme promoters will wish to comment upon the ability of their scheme to position the UK airport system so it can adapt to future changes in the aviation industry, such as those scenarios articulated by the Commission in Chapters 2 and 4 of its *Interim Report*. This may include consideration of the scalability and adaptability of their schemes, and their ensuing ability to attract airline carriers in the future. Scheme promoters may also wish to spell out their assumptions on airline behaviour, any evidence supporting these, and any changes that they anticipate to airline business models in the future.
8. Proposers should also consider their scheme relative to potential developments with key UK, European and international airports and other industry comparators, particularly in relation to the analysis set out by the Commission in Chapters 2, 3 and 4 of its Report.
9. Finally, scheme promoters should outline how their plans for scheme delivery perform in relation to the Commission's requirement to advise Government on

how to meet its assessment of the UK's connectivity needs 'as expeditiously as practicable within the required timeframe'.

10. In addition to considering how their scheme aligns with the Commission's stated assessment of the UK's international connectivity needs, promoters may also wish to articulate their own assumptions about the future global development of the national and international aviation sector, and explain the merits of their scheme in relation to this articulation.

### *Economy*

11. The Commission is interested in understanding schemes' potential to affect the socio-economic development of both specific regions and the UK as a whole.
12. To this end scheme promoters should establish why the regional or national impacts of their scheme are of particular strategic importance or benefit in local, national and international contexts.

### *Strategic overview*

13. Scheme promoters may wish to use their strategic argument to outline the performance of their schemes in relation to the entire range of Commission objectives. In particular, scheme promoters should discuss how they have sought to balance scheme performance across this range of objectives. Where particular trade-offs have been made scheme promoters should set these out explicitly.

## **Airport master plan**

*Provide details of the airfield design and its planned modes of operation, including planned airspace requirements.*

## **Objectives**

14. Scheme promoters' submissions should consider, but not be limited to, the following objectives:

Objective	Phase 2 appraisal module
To provide additional capacity and connectivity in line with the assessment of need.	Strategic Fit
To improve the experience of passengers and other users of aviation.	
To minimise noise impacts.	Noise
To protect local air quality.	Air Quality
To protect natural habitats and maintain biodiversity	Biodiversity
To minimise carbon emissions in airport construction and operation.	Carbon
To minimise impacts on existing landscape character and heritage assets.	Place
To maintain and where possible improve the quality of life for local residents and the wider population.	Quality of Life
To manage and reduce the effects of housing loss on local communities.	Community
To enhance individual airport and airports system resilience.	Operational Risk
To ensure individual airport and airports system efficiency.	Operational Efficiency
To build flexibility into scheme designs.	
To meet industry safety and security standards.	

15. Scheme promoters should establish the proposed layout/layouts of their new development, and the necessary land take, including location and grade of land, needed to construct this layout.
16. Promoters should then document the modes of operation that their airfield and airport design – their Airport Master Plan – would make possible. Of these modes of operation, they should identify those they see as most beneficial or desirable to run, and in what scenarios.
17. For each mode of operating identified, scheme promoters should comment upon its viability, risks and benefits. This could include the following topics:
  - noise and other environmental impacts on local communities and the local or national environment that are a corollary of or sensitive to the Airport Master Plan and its operations;

- airport resilience, meaning the capability of the operation to prevent, anticipate or respond robustly to disruptive events;
  - safety and security, meaning the capability of the operation to either compromise or enhance safety and to be compliant with relevant security standards;
  - scalability, adaptability and transition, meaning the capability of the operation to change from 'as is' to future airport operations, and to evolve throughout its lifetime to align with future developments in technology, fleet mix or new commercial models the airport may wish to accommodate;
  - impact on existing or planned airspace structures; and
  - integration with the wider planning context, including any relevant strategies or publications.
- 18.** In order to comment on the above topics scheme promoters will wish to consider:
- the growth or shrinkage of ATMs;
  - the growth or shrinkage of passenger numbers;
  - the ease of movement of passengers to, from and within the airport, with relation to average connect time, minimum connect time and volume flow;
  - the passage of freight;
  - the ease of access to the airport, and the movement of planes, cargo and support vehicles within the airport, in relation to journey times, average connect time, minimum connect time and volume flow; and,
  - environmental and community impacts.
- 19.** Scheme promoters shall set out the modelling assumptions and methodologies they have used when assessing operations through their Airport Master Plan.

## Engineering plans

*Comprising information on costings, energy and utilities requirements, geo-environmental issues and surface development plans.*

### Objectives

- 20.** Scheme promoters' submissions should consider, but not be limited to, the following objectives.

Objective	Phase 2 appraisal module
To promote employment and economic growth in the local area and surrounding region.	Local Economy Impacts
To protect natural habitats and maintain biodiversity.	Biodiversity
To minimise carbon emissions in airport construction and operation.	Carbon
To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk.	Water and Flood Risk
To minimise impacts on existing landscape character and heritage assets.	Place
To maintain and where possible improve the quality of life for local residents and the wider population.	Quality of Life
To manage and reduce the effects of housing loss on local communities.	Community
To be affordable and financeable, including any public expenditure that may be required and taking account the needs of airport users.	Cost and Commercial Viability
To have the equivalent overall capacity of one new runway operational by 2030.	Delivery
To build flexibility into scheme designs.	Operational Efficiency
To meet industry safety and security standards.	

- 21.** Scheme promoters should prepare an overview of the engineering requirements, constraints and impacts of their scheme proposal.
- 22.** This will include preparing robust cost plans through the identification of high level engineering, construction and maintenance costs.
- 23.** Scheme promoters should consider and assess engineering issues in the following areas:
  - energy and utilities,
  - geo-environmental (including flood risk and impacts on water resources),
  - surface development works (on site).

### *Energy and utilities*

- 24.** Scheme promoters should calculate the energy and utility requirements of their proposal (including but not limited to gas, water, waste water, sewerage and fuel), and measure these against the current energy and utilities provision at the airport site, identifying any short-fall or design difficulties that a new development would generate for either the airport or other local residents, businesses or amenities.
- 25.** Promoters should then outline what measures will be required to address any short-fall or difficulties, and associated costs. This may include plans to build new provision, reinforce existing local and regional supplies or route/re-route existing services, and will need to address the environmental consequences.
- 26.** Finally, scheme promoters should identify the fail-safe and emergency systems that currently exist or would need to be constructed in relation to the above mentioned energy and utility services, and associated costs.

### *Geo-environmental*

- 27.** Scheme promoters should undertake desk-based ground conditions assessment, comprising consideration of existing and previous uses of the development land, to determine what physical constraints and requirements exist or are likely to exist in relation to proposed or potential future engineering works, and the associated costs of overcoming these constraints or meeting these requirements.
- 28.** Promoters should establish the situation in relation to the following areas:
  - ground contamination, including requirements and options for eliminating any potential for significant environmental harm, and rendering land safe and fit for intended use (including protecting controlled waters);
  - flood risk, considering at a desk-top level all potential sources of flooding to the airport site and other areas that may be influenced by the development of the airport site, and assessment and appraisal of necessary flood defence works;
  - specialist engineering works which may be necessary due to the quality of the ground surface, such as working on land in low-lying or water-logged areas.

### *Surface development*

- 29.** Scheme promoters should undertake a high level evaluation of the site location and proposed layout's compliance with relevant requirements of the Civil Aviation Authority and other European and international aviation authorities, including the

requirements of the Safety Regulation Group’s Licensing of Aerodromes (CAP 168), both with regard to the current proposals and their potential future scalability.

- 30.** Scheme promoters should then establish, within the airport boundary and surrounding zone of influence, the engineering requirements in relation to the following aspects of surface development, and their associated costs:
- demolitions and land clearance;
  - site drainage;
  - runway and ancillary construction, including design, siting, construction and covering of runway surfaces and strips, delethalisation works, runway end safety areas, emergency access and egress, taxiways, holding areas and aprons;
  - terminal and ancillary building construction, focusing in particular on abnormal buildability issues, or abnormal engineering items and costs;
  - waste management and foul water treatment, including in relation to construction requirements;
  - safety works, allowing for safe and efficient evacuation of airports terminal buildings, offices and service buildings and vehicle parks; and,
  - the carbon footprints of the above development and construction works.

## Mitigation strategies

*Plans to limit detrimental and enhance positive impacts on the environment and local communities.*

## Objectives

- 31.** Scheme promoters’ submissions should consider, but not be limited to, the following objectives:

Objective	Phase 2 appraisal module
To maximise number of travellers arriving at the airport on public transport, or promote green modes of transport.	Surface Access
To accommodate the needs of other users of transport networks, such as commuters, intercity travellers and freight.	

Objective	Phase 2 appraisal module
To minimise noise impacts.	Noise
To protect local air quality.	Air Quality
To protect natural habitats and maintain biodiversity.	Biodiversity
To minimise carbon emissions in airport construction and operation.	Carbon
To protect the quality of surface and ground waters, use water resources efficiently and minimise flood risk.	Water and Flood Risk
To minimise impacts on existing landscape character and heritage assets.	Place
To maintain and where possible improve the quality of life for local residents and the wider population.	Quality of Life
To manage and reduce the effects of housing loss on local communities.	Community
To reduce or avoid disproportionate impacts on any social group.	
To actively engage local groups in scheme progression, design and management.	Delivery

- 32.** Scheme promoters should identify any harmful impacts, or risks of harmful impacts, their scheme may have on local residents, local communities or the local environment, and outline what measures they plan to put in place to limit these impacts or risks.
- 33.** Equally, scheme promoters should consider the opportunities to enhance or improve the local environment or local communities, and outline what measures they plan to put in place to capitalise on these opportunities, while seeking innovative ideas regarding community engagement, employment, training, youth employment and education.
- 34.** Promoters will be guided as to the Commission's particular environmental and community concerns by referring to the relevant modules of this Appraisal Framework. Promoters should construct their mitigation strategies with these in mind.
- 35.** In particular promoters should provide details on, but not be limited to, the following areas:

### *Noise*

- 36.** Any noise mitigation and compensation measures that schemes will establish for the benefit of current or future local communities or amenities.
- 37.** Any noise management plans, through, for example, airport operations or environmental mitigations, that schemes plan to adopt that will particularly benefit or involve local residents and the local community.

### *Air quality*

- 38.** Any actions or systems that schemes plan to deploy to achieve air quality impacts, in relation to either the airfield or the airport's associated surface access.

### *Place*

- 39.** Any proposals to mitigate landscape, townscape, waterscape or heritage impacts, including:
  - efforts to mitigate visual impacts through visually sympathetic siting of developments;
  - efforts to preserve, relocate or rebuild affected heritage pieces;
  - efforts to manage the airport and its traffic so as to mitigate as far as possible potential impacts on landscape, townscape, waterscapes, heritage or tranquility.

### *Biodiversity*

- 40.** Any proposals to mitigate biodiversity impacts, or to maintain and stimulate biodiversity in the local area.

### *Water*

- 41.** Any proposals to impact on water quality and quantity, and any plans to develop sustainable use of water resources including using water efficiently across the airport.
- 42.** Any efforts to ensure that an airport's water use is carefully integrated into the existing needs and demands of the local environment.

### *Community*

- 43.** Any plans promoters have to preserve or enhance the integrity, identity or prosperity of the local community through the construction and operating of a new development (for example, training or recruitment programmes they plan to operate in the local area) and to promote social cohesion and sustain community relations.
- 44.** The effect of demolishing homes and community facilities on existing residents.

- 45. Any plans promoters have to stimulate, engage or develop the decision-making processes associated with their airport and the local community.
- 46. Scheme promoters should set out any modelling assumptions and methodologies they have used when assessing environmental and community impacts.

## Development strategies

*How the additional capacity would be funded and project-managed to delivery.*

### Objectives

- 47. Scheme promoters' submissions should consider, but not be limited to, the following objectives:

Objective	Phase 2 appraisal module
To promote employment and economic growth in the local area and surrounding region.	Local Economy Impacts
To minimise carbon emissions in airport construction and operation.	Carbon
To make efficient use of public funds, where they are required, and ensure that the benefits of schemes clearly outweigh the costs, taking account of social, environmental and economic costs and benefits.	To be assessed in the business case
To be affordable and financeable, including any public expenditure that may be required and taking account of the needs of airport users.	Cost and Commercial Viability
To have the equivalent overall capacity of one new runway operational by 2030.	Delivery
To actively engage local groups in scheme progression, design and management.	

### Financing plans

- 48. Scheme promoters should determine the overall cost of the proposal, in conjunction with the methodologies established in the Commission's Cost and Commercial Viability module, and set out a proposed financing strategy. Such a strategy may include the following areas:

- Determination (in conjunction with the Commission's Cost and Commercial Viability appraisal) of whether the scheme's costs could be financed without the need for public support and, if not, the scale and nature of any public support that may be required.
- Identification of particular elements of Government support (e.g. direct grant, debt guarantee) which might be required to underpin commercial viability of the proposal and their compatibility with EU state aid rules.
- Determination of the credibility of underpinning assumptions regarding charges to airlines and single-till income.
- Examination of the level of uncertainty associated with any of the above assumptions and the according risk that estimates could vary over time.
- Creation of an outline financial model for the scheme, including an integrated profit and loss, cash-flow and balance sheet, with supporting materials providing a clear explanation of assumptions made.
- Consideration of likely reactions of commercial rivals, in the UK and internationally, that may further impact demand.
- Identification of prospective investors, or groups or types of investors, who are likely to help finance the new facility.
- Determination (considering all of the above) of the risk that exists around the overall commercial viability of the scheme.
- Any modelling assumptions and methodologies used throughout this process should be clearly set out.

### *Construction*

- 49.** Scheme promoters should establish the likely timetable, and associated risk profile, for the construction of both airport and surface access infrastructure.
- 50.** This should include consideration of key dependencies on the effective delivery of scheme proposals, such as the requirement to undertake airspace redesigns, the delivery of surface access, any plans to reduce disruption during construction, the requirement to alter other airports' characteristics and/or capacity, and the time required and complexity of detailed safety cases to underpin the new airport's operations (particularly if there are novel approaches to delivery). The risks of delay arising from other assessments, such as the environmental assessments, should also be considered as part of this work.

- 51.** Scheme promoters should also set out an outline strategy for managing the transitional period until any new capacity can be brought into operation. This should take into account the preservation of the UK's connectivity. Scheme promoters should take as their baseline the Commission's recommendations for making best use of existing capacity, as presented in the *Interim Report*, but should use their submission to identify and, where appropriate, suggest mitigations for any risks or issues particular to their own proposal.
- 52.** Any assumptions used throughout should be clearly set out, and scheme promoters should highlight any areas where there are doubts about the underlying data, or where they know further work is required to strengthen their assumptions.

### *Planning*

- 53.** Scheme promoters should set out how their scheme integrates into the wider planning context, including any relevant local, regional or national strategies.
- 54.** Scheme promoters should then set out what they consider the key risks to gaining planning permission are and give details of any plans or strategies they envisage utilising to mitigate these.

### *Engagement*

- 55.** Scheme promoters should set out the details of any engagement undertaken with local stakeholders and communities and comment on the extent to which their views have been accounted for in the evolution of scheme designs. Details of any future plans for engagement should also be set out.

# Appendix C: Consultation questions

1. Are the objectives stated in Table 3.1 suitable for assessing the short-listed options? If not please explain why not, and suggest any alterations you feel would make them more suitable.
2. Are there any other objectives that the Commission should consider, and if so what are they?
3. Will the appraisal modules described in Appendix A be sufficient to analyse the short-listed options against the stated objectives? If not please explain why not, and provide examples or evidence to support your answer.
4. Will the appraisal modules described in Appendix A be sufficient to construct business cases and sustainability assessments to enable the Commission to make recommendations and the Government to act on these? If not please explain why not, and provide examples or evidence to support your answer.
5. Are the five components of the updated scheme design set out in Appendix B suitable for understanding schemes' potential performance against the stated objectives? If not, please suggest any modifications that you think would make them more suitable.
6. Is the level of detail in the components for the updated scheme design set out in Appendix B appropriate given the likelihood that some schemes may not progress to full stages of development? Please provide examples or evidence to support your answer.

## **Contact Information**

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