

APPRAISAL OF SUSTAINABILITY:  
AIRPORTS NATIONAL POLICY  
STATEMENT

DEPARTMENT FOR TRANSPORT

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Department  
for Transport



# APPRAISAL OF SUSTAINABILITY: AIRPORTS NATIONAL POLICY STATEMENT

**Department for Transport**

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## ABBREVIATIONS

A/HMWB	Artificial/Heavily Modified Water Bodies
AC	Airports Commission
ACDM	Airport Collaborative Decision Making
AEP	Annual Exceedance Probability
AGLV	Areas of Great Landscape Value
ALC	Agricultural Land Classification
AONBs	Areas of Outstanding Natural Beauty
AoS	Appraisal of Sustainability
APD	Air Passenger Duty
APF	Aviation Policy Framework
APPS	Approach Surface
APU	Auxiliary power unit
AQMAs	Air Quality Management Areas
AQO	Air Quality Objectives
ATMs	Air Transport Movements
BAP	Bickerdike Allen Partners
BEIS	Department of Business, Energy and Industrial Strategy
C&I	Commercial and industrial
CAA	Civil Aviation Authority
CAMS	Catchment Abstraction Management Strategies
CCC	Committee on Climate Change
CEB	Community Engagement Board
CEMP	Construction Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CPRE	Campaign for the Protection of Rural England
CRC	Carbon Reduction Commitment
cSAC	candidate Special Areas of Conservation
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DPI	Departure Planning Information
EA	Environment Agency
EEA	European Economic Area
EfW	Energy from Waste

EIA	Environmental Impact Assessment
EqIA	Equalities Impact Assessment
ERCD	Environmental Research and Consultancy Department
ESA	Ecosystem Services Assessment
EU ETS	European Union Emissions Trading System
FAS	Future Airspace Strategy
FDI	Foreign Direct Investment
GCR	General Conservation Review
GDP	Gross Domestic Product
GLAAS	Greater London Archaeological Advisory Service
GVA	Gross Value Added
HER	Historic Environment Records
HIA	Health Impact Analysis
HRA	Habitats Regulations Assessment
ICAO	International Civil Aviation Organisation
IEMA	Institute of Environmental Management and Assessment
ILS	Instrument Landing System
IMO	International Maritime Organisation
IROPI	Imperative reasons of overriding public interest
JNCC	Joint Nature Conservation Council
LAMP	London Airspace Management Programme
LGW-2R	London Gatwick Second Runway
LHR-ENR	London Heathrow Extended Runway
LHR-NWR	London Heathrow Northwest Runway
LNR	Local Nature Reserves
LOAEL	Lowest Observed Adverse Effect Level
LVP	Low visibility procedures
LWS	Local Wildlife Site
MLS	Microwave Landing System
Mppa	Million passengers per annum
NAEI	National Atmospheric Emissions Inventory
NATS	National Air Traffic Service
NCA	National Character Area
NOEL	No Observed Effect Level
NPPF	National Planning Policy Framework
NPR	Noise Preferential Routes

NPS	National Policy Statement
NPSE	Noise Policy Statement for England
NVZ	Nitrate Vulnerable Zone
OEL	Observable Effects Levels
ONS	Office of National Statistics
OSR	Other Sensitive Receptors
PCM	Pollution Climate Mapping
PPE	Personal protective equipment
PPG	Planning Practice Guidance
PPP	Policies, plans and programmes
PRoW	Public Rights of Way
pSNCI	proposed Site of Nature Conservation Interest
PSOs	Public Service Obligations
pSPA	potential Special Protection Areas
QC	Quota count
RBMP	River Basin Management Plan
RIGS	Regionally important geological and geomorphological sites
SA	Sustainability Appraisal
SAC	Special Areas of Conservation
SEA	Strategic Environmental Assessments
SEB	Statutory Environmental Bodies
SES	Single European Sky
SESAR	Single European Sky Air Traffic Management Research
SESW	Sutton and East Surrey Water
SIDS	Standard Instrument Departure routes
SINC	Site of Importance to Nature Conservation
SMINC	Site of Metropolitan Importance for Nature Conservation
SNCI	Site of Nature Conservation Interest
SNH	Scottish Natural Heritage
SOAEL	Significant Observed Adverse Effects Level
SoP	Statement of Principles
SPA	Special Protection Area
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest
STW	Sewage Treatment Works
SWLW	South West London Water Bodies

TBS	Time Based Separation
TBC	To be confirmed
TEAM	Tactically Enhanced Arrivals Mode
TOCS	Take-off Climb Surface
ToR	Terms of Reference
UAE	Unacceptable Adverse Effect
UK BAP	UK Biodiversity Action Plan
ULEZ	Ultra Low Emission Zone
WFD	Water Framework Directive
WFDa	Water Framework Directive Assessments
WRMP	Water Resource Management Plans
ZoI	Zone of Influence
ZTV	Zone of Theoretical Visibility

# 1 INTRODUCTION

## 1.1 INTRODUCTION

1.1.1 The Department for Transport (DfT) is responsible for setting national aviation policy, working with airlines, airports, the Civil Aviation Authority (CAA) and NATS (the UK's National Air Traffic Service). Supporting the development of aviation and improving passenger experience is one of DfT's priorities.<sup>1</sup>

1.1.2 DfT commissioned WSP to prepare this Appraisal of Sustainability (AoS) to inform government of the economic, social and environmental effects of the schemes to increase aviation capacity. The findings of the AoS have informed and influenced the Airports National Policy Statement (NPS), including the need for measures to avoid or mitigate effects of the construction of a new runway at a project level.

1.1.3 The AoS sets out the Government's assessment of the Heathrow Northwest Runway scheme, and considers alternatives.

## 1.2 BACKGROUND

1.2.1 The ability to move people and goods across the globe in a matter of hours is fundamental to the global economy. Airports themselves can also make an important contribution to their local economies, being major employers in their own right and having the potential to attract companies whose business depends on air travel into their immediate proximity. Airports also contribute to quality of life, enabling people to travel abroad for leisure, broaden their horizons, or visit friends and relatives.

1.2.2 The Airports Commission (AC), chaired by Sir Howard Davies, was set up in November 2012 to undertake an independent examination of the scale and timing of any necessary steps to maintain the UK's status as Europe's most important aviation hub<sup>2</sup>. They published their report on 1st July 2015.<sup>3</sup>

1.2.3 The AC's Final Report notes that some of the consequences of aviation are not so positive. Air travel already makes a significant contribution to global greenhouse gas emissions and this relative contribution is set to grow as other industries take steps to decarbonise. Other environmental impacts are more local in scope. Aircraft noise causes considerable annoyance to the communities it affects and there is a growing body of evidence regarding its impacts on human health. New infrastructure developments can alter landscapes and affect wildlife and impact on cultural heritage. The challenge of passengers accessing airports can also place stress on surface transport networks, potentially leading to congestion and exacerbating air quality issues in addition to those resulting from aircraft.

1.2.4 All three shortlisted promoters continued to refine their schemes following the formal submission of scheme designs in May 2014 to the AC. These refinements were not captured within the AC's appraisals but have been assessed within this AoS. It should be noted that during further stages of detailed design further variations are expected in order to continue to reduce negative environmental and social effects.

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<sup>1</sup> Department for Transport, 2015. Homepage: About us. [\[online\]](#) Accessed 01/08/2015.

<sup>2</sup> Airports Commission, 2013. *Interim Report*. [\[online\]](#) Accessed 01/08/2015.

<sup>3</sup> Airports Commission, 2015. *Final report*. [\[online\]](#) Accessed 01/08/2015.

- 1.2.5 In December 2015 the government accepted the AC's case for airport expansion in the South East and the shortlist of schemes for expansion. They have continued to work on environmental impacts and develop the best possible package of measures to mitigate the impacts on local people and the environment.
- 1.2.6 On 25 October 2016, the Government confirmed that it had completed its further work. It also announced that a new Northwest Runway at Heathrow Airport was its preferred scheme to deliver additional airport capacity in the South East of England.
- 1.2.7 The draft Airports NPS and supporting AoS were first published on 2 February 2017 and a 16 week public consultation was launched. On publishing the draft Airports NPS, the Government made a commitment to continue updating its evidence base on airport capacity, including revised passenger demand forecasts and the impact of publication of the final Air Quality Plan (the UK plan for tackling roadside nitrogen dioxide concentrations). In order to provide clarity, the Government subsequently updated the draft Airports NPS and some of the other documents which were published alongside it, on the basis of these changes to the evidence base and as a result of initial consideration of the responses to the February consultation and other broader Government policy changes which arose during that period. The Revised draft Airports NPS and AoS were published on 24 October 2017, and an 8 week consultation was undertaken.
- 1.2.8 Parliamentary scrutiny took place between October 2017 and March 2018, with the Transport Committee (TC) publishing a report with recommendations. The Government has then published final versions of the Airports NPS and AoS following consideration of responses to the October consultation and recommendations in the TC report. This final version of the AoS addresses any further changes identified through this consideration.

### 1.3 THE PROPOSED POLICY: AIRPORTS

- 1.3.1 The Airports NPS sets out:
- The Government's policy on the need for new airport capacity in the South East of England;
  - The Government's preferred location and scheme to deliver new capacity; and
- Particular considerations relevant to a development consent application to which the Airports NPS relates.
- 1.3.2 It sets out planning policy in relation to applications for any airport nationally significant infrastructure project (NSIP) in the South East of England, and its policies will be important and relevant for the examination by the Examining Authority, and decisions by the Secretary of State in relation to such applications.
- 1.3.3 Once the NPS is designated, the Secretary of State will use it as the primary basis for making decisions on any development consent application for a new Northwest Runway at Heathrow Airport, which is the Government's preferred scheme. The preferred scheme has a runway length of at least 3,500m and enables at least 260,000 additional Air Transport Movements (ATMs).<sup>4</sup> It will also have effect in relation to terminal infrastructure associated with the Heathrow Northwest Runway scheme and the reconfiguration of terminal facilities in the area between the two existing runways at Heathrow Airport Under section 104 of the Planning Act, the Secretary of State must decide the application in accordance with any relevant NPS unless he or she is satisfied that to do so would:
- Lead to the UK being in breach of its international obligations;

<sup>4</sup> The Draft Airports NPS stipulates the length of the new runway to ensure that the new infrastructure can accommodate the largest commercial aircraft, as they operate many of the long haul flights that support the UK's position as a major aviation hub

- Be unlawful;
- Lead to the Secretary of State being in breach of any duty imposed by or under any legislation;
- Result in adverse impacts of the development outweighing its benefits; or
- Be contrary to legislation about how the decisions are to be taken.<sup>5</sup>

## 1.4 THE APPRAISAL OF SUSTAINABILITY (AOS)

- 1.4.1 The Planning Act 2008 requires that an AoS must be carried out before an NPS can be designated. The main purpose of an AoS is to examine the likely social, economic and environmental effects of designating the NPS. If potential significant adverse effects are identified, the AoS recommends options for avoiding or mitigating such effects. In this way, the AoS helps inform the preparation of the NPS to promote sustainable development.
- 1.4.2 Sustainability Appraisals (SA) are a requirement of the Planning and Compulsory Purchase Act 2004 and Strategic Environmental Assessments (SEA) are required by European Directive EC/2001/42 (SEA Directive), which was transposed into UK law by the Environmental Assessment of Plans and Programmes Regulations 2004 (SEA Regulations). Central government guidance<sup>6</sup> has merged these processes to allow for a single joint appraisal to be carried out.
- 1.4.3 An AoS of a NPS will follow a similar process and provide a similar outcome to a SA of a strategic plan. Therefore, the AoS of the NPS would incorporate an assessment in accordance with the requirements of the SEA Regulations, therefore also complying with the 'SEA Directive', which aims for a high level of environmental protection and to promote sustainable development. It applies to certain plans that are likely to have significant effects on the environment. The AoS will consider socio-economic effects in the same way as environmental effects are required to be assessed by the SEA Regulations and SEA Directive.
- 1.4.4 The approach to the AoS is modelled on the Government's guidance for preparing SEAs and SA, as there is no guidance yet on preparing an AoS. This is a staged approach and is set out in Section 3. In this document, the term AoS includes the application of SEA and SA-
- 1.4.5 By law, before designating an Airports NPS, an AoS must be carried out. This AoS is a strategic level assessment. It is based on the contents of the Airports NPS. The AoS considers alternatives to the Government's preferred scheme as set out in the Airports NPS, including the outline masterplans supplied to the Airports Commission for the three shortlisted schemes. This AoS considers the impacts of expansion without the benefits of the mitigation package put forward by scheme promoters, unless stated otherwise. The Government has outlined that it expects a significant mitigation package to be put in place by the promoter of its preferred scheme to ensure that wherever possible significant effects are avoided, reduced or offset.
- 1.4.6 Further project-level design will be required which will inform an environmental impact assessment carried out by the promoter. This would include an assessment, which is likely to include effects identified in the AoS as well as more detailed mitigation developed as detailed design progresses. This will also be developed through consultation with both affected communities and other stakeholders.

<sup>5</sup> *Planning Act 2008* Section 104 – decisions in cases where National Policy Statement has effect.

<sup>6</sup> Department for Communities & Local Government, 2015. *Strategic environmental assessment and sustainability appraisal*. [\[online\]](#) Accessed 01/08/2015.

## 1.5 REQUIREMENTS OF THE SEA DIRECTIVE

1.5.1 This report meets the requirements of the SEA Regulations with the preparation of an Environmental Report in accordance with Regulation 12(3)), as follows;

- (2) *The report shall identify, describe and evaluate the likely significant effects on the environment of (a) implementing the plan or programme; and (b) reasonable alternatives taking into account the objectives and the geographical scope of the plan or programme.*
- (3) *The report shall include such of the information referred to in Schedule 2 to these Regulations as may reasonably be required, taking account of (a) current knowledge and methods of assessment; (b) the contents and level of detail in the plan or programme; (c) the stage of the plan or programme in the decision-making process; and (d) the extent to which certain matters are more appropriately assessed at different levels in that process in order to avoid duplication of the assessment.*

1.5.2 The information referred to in Schedule 2 of the SEA Regulations (Regulation 12(3)) is set out in Table 1.1 below.

**Table 1.1: SEA Regulations and the AoS**

SEA Regulations (12(3)) - Schedule 2 Information For Environmental Report Requirements	AoS Report
1. An outline of the contents, main objectives of the plan or programme, and relationship with other relevant plans and programmes;	The Airports NPS is summarised in Section 2. A review was undertaken for the Scoping Report <sup>7</sup> of other relevant plans, policies and programmes and is summarised in Section 4.  A summary of policy and legislation relevant to each topic is provided in Appendix A.
2. The relevant aspects of the current state of the environment and the likely evolution thereof without implementation of the plan or programme;	Appendix A contains the topic based assessments which include baseline and future baseline.
3. The environmental characteristics of areas likely to be significantly affected;	The baseline for each topic in Appendix A describes the environmental characteristics of the three alternative schemes, including the scheme which is the subject of the NPS.
4. Any existing environmental problems which are relevant to the plan or programme including, in particular, those relating to any areas of a particular environmental importance, such as areas designated pursuant to Council Directives 79/409/EEC on the conservation of wild birds and the Habitats Directive;	Environmental issues as well as Plans, Policies and Programmes that have the potential to influence aviation capacity, were also identified during the scoping stage (see Section 4) and inform the Appraisal Framework in Section 5 of this report.  Appendix A contains the topic based assessments which include existing and future environmental issues.  The Biodiversity assessment in Appendix A, considers areas designated under the Birds and Habitats Directive. A separate 'Habitats Regulations Assessment' has also been undertaken.

<sup>7</sup> WSP, 2016, *Appraisal of Sustainability: Airports NPS Scoping Report*

**Table 1.1: SEA Regulations and the AoS**

<b>SEA Regulations (12(3)) - Schedule 2 Information For Environmental Report Requirements</b>	<b>AoS Report</b>
5. The environmental protection objectives, established at international, Community or Member State level, which are relevant to the plan or programme and the way those objectives and any environmental considerations have been taken into account during its preparation;	<p>The topics in Appendix A include a review of policy and legislation which has been taken into account by the assessment of the NPS.</p> <p>The scoping report also undertook a full review of policies, plans and programmes which may affect the Airports NPS (Appendix A of the Scoping Report). Section 4.3 summarises the key sustainability themes and objectives.</p>
<p>6. The likely significant effects on the environment, including short, medium and long-term effects, permanent and temporary effects, positive and negative effects, and secondary, cumulative and synergistic effects, on issues such as –</p> <p>(a) biodiversity;</p> <p>(b) population;</p> <p>(c) human health;</p> <p>(d) fauna;</p> <p>(e) flora;</p> <p>(f) soil;</p> <p>(g) water;</p> <p>(h) air;</p> <p>(i) climatic factors;</p> <p>(j) material assets;</p> <p>(k) cultural heritage including architectural and archaeological heritage;</p> <p>(l) landscape; and</p> <p>(m) the interrelationship between the issues referred to in sub-paragraphs (a) to (l);</p>	<p>The topic based assessments in Appendix A, which are summarised in Sections 6 and 7 of this report, were derived from a review of sustainability issues. Their relationship to the topics in the Directive is shown in the Appraisal Framework in Table 4.2.</p> <p>The assessments in Appendix A also identify interrelationships between issues and this is also summarised in Section 4.</p>
7. The measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme;	Mitigation measures are set out in Table 7-3 in Section 7 of this report.
8. An outline of the reasons for selecting the alternatives dealt with, and a description of how the assessment was undertaken including any difficulties (such as technical deficiencies or lack of know-how) encountered in compiling the required information;	The reasons for selection of the short-listed alternatives are set out in Section 5. The methodology for the assessment is set out in Section 3, with additional topic-based information in Appendix A.
9. A description of the measures envisaged concerning monitoring in accordance with regulation 17;	Table 7-4 in Section 7 of this report sets out the proposed monitoring measures.

**Table 1.1: SEA Regulations and the AoS**

<b>SEA Regulations (12(3)) - Schedule 2 Information For Environmental Report Requirements</b>	<b>AoS Report</b>
10. A non-technical summary of the information provided under paragraphs 1 to 9.	This is provided at the start of this report.

# 2 AIRPORTS NPS

## 2.1 INTRODUCTION

2.1.1 This section of the report sets out the background to the NPS and its main objectives.

2.1.2 The AC published its Final Report in July 2015, which set out its recommendations to Government for expanding aviation capacity in the UK.

2.1.3 Since this time, Government has reviewed the analysis which underpins the recommendations. The NPS has been prepared to support the delivery of new aviation capacity in the UK.

## 2.2 THE AIRPORTS COMMISSION

2.2.1 The AC undertook a detailed review, informed by a series of discussion papers covering key thematic issues, of the UK's aviation capacity and connectivity requirements. This included considering how demand for air travel in the UK was likely to develop across a range of future scenarios.

2.2.2 The AC concluded that the UK faces no immediate capacity crisis. The country is one of the best connected in the world, and London has the largest origin and destination market in the world. However, future demand forecasts across a range of scenarios predict significant growth in demand for aviation to 2050 which will exceed total available capacity.

2.2.3 The AC looked at accommodating this future demand through a variety of means, including measures to meet the UK's aviation capacity and connectivity needs without the provision of new runway infrastructure. These included measures to redistribute aviation demand to less congested airports and surface access investment to replace the need for domestic air movements. The AC found that none of these schemes were effective in reducing the capacity shortfall and therefore without the provision of new infrastructure the London airport system is likely to be under very substantial pressure by 2030, and demand will significantly exceed total available capacity by 2050.

2.2.4 Section 5 of this report provides further information on how schemes were assessed by the AC and the short-listing of three schemes which provide the alternatives for assessment within this AoS.

## 2.3 GOVERNMENT POLICY ON AIRPORTS

2.3.1 The Airports NPS sets out:

- The Government's policy on the need for new airport capacity in the South East of England;
- The Government's preferred location and scheme to deliver this; and
- Particular considerations relevant to a development consent application to which the Airports NPS relates.

2.3.2 It sets out planning policy in relation to applications for any airport expansion. The proposed scheme will be classified as a NSIP and will need to submit an application to obtain a Development Consent Order (DCO) from the Secretary of State. The NPS provides the basis for the examination of the application and decisions by the Secretary of State.

### THE NEED FOR ADDITIONAL CAPACITY

- 2.3.3 The UK aviation sector plays an important role in the modern economy. It is essential to allow domestic and foreign companies to access existing and new markets, and to help deliver trade and investment, linking us to valuable international markets and ensuring that the UK is open for business. It facilitates trade in goods and services, enables the movement of workers and tourists, and drives business innovation and investment, being particularly important for many of the fastest growing sectors of the economy.
- 2.3.4 The UK is the third largest aviation network in the world after the USA and China.<sup>8</sup> The sector benefits the UK economy through its direct contribution to Gross Domestic Product (GDP) and employment, and by facilitating trade and investment, manufacturing supply chains, skills development and tourism. In 2014 the UK aviation sector generated around £20 billion<sup>9</sup> of economic output and directly employed around 230,000 workers<sup>10</sup>, supporting many more jobs indirectly. The importance of aviation to the UK economy, and in particular its hub status, has only increased following the decision to leave the European Union. As the UK develops its new trading relationship with the rest of the world, it will be essential that increased airport capacity is delivered to support the development of long-haul routes to and from the UK from around the world, particularly to emerging and developing economies.
- 2.3.5 The UK now faces a significant capacity challenge. No new full-length runway has been built in the South East since the 1940s. Heathrow is currently the busiest two-runway airport in the world, while Gatwick is the busiest single runway airport. London's airports are filling up fast, and will all be full by the mid-2030s if we do not take action.<sup>11</sup> Aviation demand is likely to increase significantly between now and 2050. All major South East airports<sup>12</sup> are expected to be full by the mid-2030s, with 4 out of 5 full by the mid-2020s. By 2050, demand at these airports is expected to outstrip capacity by at least 34%, even on the DfT's low demand forecast.<sup>13</sup> There is relatively little scope to redistribute demand away from the South East to less heavily utilised capacity elsewhere in the country. The consequences of not expanding South East airport capacity are detrimental to the UK economy and its strategic hub status.
- 2.3.6 In September 2012, the Government established the independent AC<sup>14</sup> to examine the scale and timing of any requirement for additional capacity to maintain the UK's position as Europe's most important aviation hub, and identify and evaluate how any need for additional capacity should be met in the short, medium and long term.
- 2.3.7 In its interim report in December 2013, the AC concluded that there was a need for one net additional runway to be in operation in the South East of the UK by 2030. The Government has reviewed the AC's work and concluded that its evidence base on the case for expansion and its use of this evidence are both sound.

<sup>8</sup> World Economic Forum, 2015. The *Global Competitiveness Report 2014–2015*. [online] Accessed 12/01/2017. (Based on available airline seat kilometres).

<sup>9</sup> Office for National Statistics, 2016. *Input-Output Supply and Use tables, 2014*. [online] Accessed 06/01/2017.

<sup>10</sup> Office for National Statistics, *Business Register and Employment Survey, 2014*. [online] Accessed 06/01/2017.

<sup>11</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report*

<sup>12</sup> Defined as Gatwick, Heathrow, London City, Luton and Stansted

<sup>13</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report*

<sup>14</sup> UK Government, 2015. Airports Commission. [online] Accessed 06/01/2017.

## THE GOVERNMENT'S PREFERRED LOCATION AND SCHEME

- 2.3.8 The AC undertook a detailed shortlisting process which resulted in three shortlisted schemes being considered by the Government for additional airport capacity:
- Heathrow Northwest Runway scheme (LHR-NWR) (which the AC recommended);
  - Gatwick Second Runway scheme (LGW-2R); and
  - Heathrow Extended Northern Runway scheme (LHR-ENR).
- 2.3.9 The AC undertook a separate feasibility assessment of the Thames Estuary Airport, but in September 2014 made the decision not to add the proposal to the shortlist of schemes<sup>15</sup>. This decision was based on an environmental impacts study published in July 2014, and also further studies in relation to surface access impacts, socio-economic impacts and operational feasibility and attitudes to moving to a new airport.
- 2.3.10 The Government accepted the AC's three shortlisted schemes in December 2015, concluding that one new runway via one of the schemes was its preferred method to address the issue of airport capacity in the South East of England.
- 2.3.11 Following the publication of the AC's Final Report, the Government undertook a programme of further work on air quality, noise, carbon emissions and impacts on local communities. On 25 October 2016, the Government announced that its preferred scheme to deliver new airport capacity in the South East of England was a new Northwest Runway at Heathrow Airport. In identifying which scheme best meets the need for a new runway in the South East of England, a wide range of factors have been taken into account, including:
- International connectivity and strategic benefits;
  - Passenger and wider economic benefits;
  - Domestic connectivity and regional impacts;
  - Surface access links;
  - Views of airlines and the business community;
  - Financeability;
  - Deliverability; and
  - Local environmental impacts.
- 2.3.12 The draft Airports NPS and supporting AoS were first published on 2 February 2017 and a 16 week public consultation was launched. On publishing the draft Airports NPS, the Government made a commitment to continue updating its evidence base on airport capacity, including revised passenger demand forecasts and the impact of publication of the final Air Quality Plan (the UK plan for tackling roadside nitrogen dioxide concentrations). In order to provide clarity, the Government subsequently updated the draft Airports NPS and some of the other documents which were published alongside it, on the basis of these changes to the evidence base and as a result of initial consideration of the responses to the February consultation and other broader Government policy changes which arose during that period. The Revised draft Airports NPS and AoS were published on 24 October 2017, and an 8 week consultation was undertaken.
- 2.3.13 Parliamentary scrutiny took place between October 2017 and March 2018, with the Transport Committee (TC) publishing a report with recommendations. The Government has then published

<sup>15</sup> Airports Commission, 2014. *Airports Commission announces inner Thames estuary decision*. [\[online\]](#) Accessed 01/08/2015.

final versions of the Airports NPS and AoS following consideration of responses to the October consultation and recommendations in the TC report. This final version of the AoS addresses any further changes identified through this consideration.

2.3.14 More information is provided in the NPS and Section 7.2 of this AoS.

## ASSESSMENT PRINCIPLES WITHIN THE NPS

2.3.15 There is a presumption in favour of granting development consent for the airports NSIP covering the LHR-NWR scheme within the needs case established in this NPS, provided it adheres to the detailed policies and protections set out in the NPS, and the legal constraints contained within the Planning Act 2008. However, in considering any proposed development, the Examining Authority and the Secretary of State would need to weigh its adverse impacts against its benefits, taking into account:

- Its potential benefits, including the facilitation of economic development (including job creation), housing and environmental improvement, and any long term or wider benefits; and
- Its potential adverse impacts (including any longer term and cumulative adverse impacts) as well as any measures to avoid, reduce or compensate for any adverse impacts.

2.3.16 Section 4 of the NPS sets out the general assessment principles which will apply to the scheme. These include:

- Environmental Impact Assessment (EIA) – this is the process undertaken under the EIA Regulations during more detailed design of a project which describes likely significant effects and the measures envisaged for avoiding or mitigating those effects. This would also include cumulative effects.
- Habitats Regulations Assessment (HRA) – this is the process undertaken under the Habitats Regulations and will be repeated during detailed design to determine whether the scheme could have a significant effect on the objectives of a site designated for nature conservation at the European level. If it is impossible to rule out an adverse effect on the integrity of a European site, the proposal would need to meet three tests. These tests are that no feasible, less damaging alternative solutions that would deliver the plan objective exist, that there are imperative reasons of overriding public interest (IROPI) for the proposal going ahead, and that adequate and timely compensation measures will be put in place.
- Equalities Assessment – The Equality Act 2010 provides protections to people with certain “protected characteristics” and includes a public sector equality duty which requires public authorities in the exercise of their functions to show due regard to the need to eliminate unlawful discrimination, harassment, and victimisation; to advance equality of opportunity; and to foster good relationships between people who share protected characteristics and those who do not. The Equality Assessment process therefore focuses on assessing and recording the likely equalities effects as a result of a policy, project or plan.
- Alternative requirements – Processes such as EIA, HRA, and assessment under the Water Framework Directive (WFD) and other policies, such as those relating to flood risk require consideration of alternatives.
- Criteria for good design of airport infrastructure - including visual appearance, sustainable use of materials, improved operational conditions, resilience (e.g. to flooding and natural hazards), functionality, fitness for purpose, security, siting and design relative to existing landscape or historical character.
- Cost - demonstrating the scheme is cost efficient and sustainable.
- Climate change adaptation – The scheme will need to consider hotter, drier summers and warmer, wetter winters. There is potentially an increased risk of flooding, drought, heatwaves, intense rainfall events and other extreme events such as storms. The scheme will need to

take into account climate change projections and adaptation measures will be required, including green infrastructure.

- Pollution control and other environmental protection regimes – The scheme will be subject to existing legislation and consenting relating to discharges or emissions which affect air quality, water quality, land quality, or which include noise and vibration.
- Common law nuisance and statutory nuisance – the scheme will need to comply with the Environmental Protection Act in relation to nuisance.
- Security considerations and design of proportionate protective security measures.
- Health – direct (e.g. traffic, noise, vibration, air quality and emissions, light pollution, community severance, dust) and indirect effects (e.g. effects on transport and opportunities for walking and cycling, open space for recreation) on human health should be considered further within the EIA.
- Accessibility – design should take reasonable opportunities to improve access for those affected, including disabled users. This includes the national road network and rail stations.

## SPECIFIC IMPACTS AND REQUIREMENTS WITHIN THE NPS

### 2.3.17

Chapter 5 of the NPS focuses on the impacts of the potential development and how these impacts should be mitigated. It sets out the approach, mitigation and decision making in relation to a number of topics, many of which are related to sustainability and are considered within this AoS:

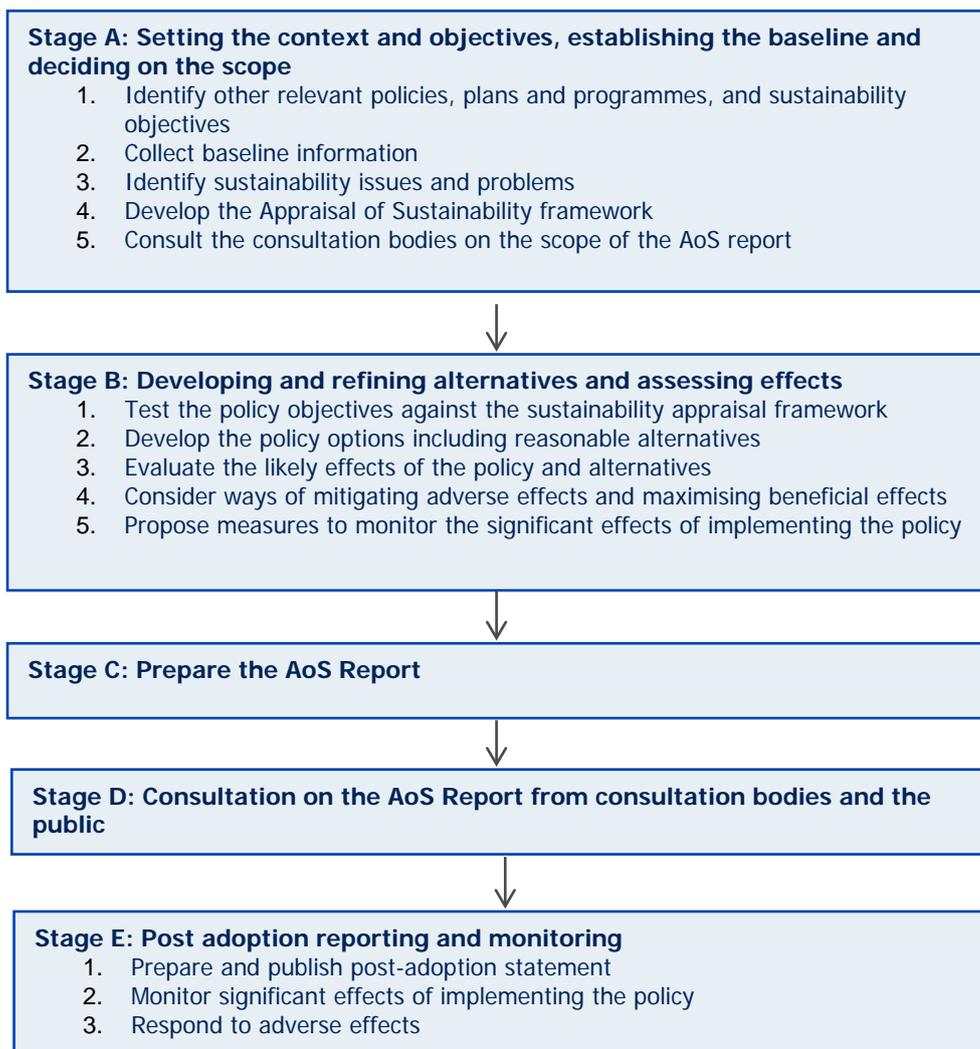
- Introduction
- Surface access
- Air quality
- Noise
- Carbon emissions
- Biodiversity and ecological conservation
- Land use including open space, green infrastructure and Green Belt
- Resource and waste management
- Flood risk
- Water quality and resources
- Historic environment
- Landscape and visual impacts
- Land instability
- Dust, odour, artificial light, smoke and steam
- Community compensation
- Community engagement
- Skills
- Ruling out a fourth runway

# 3 APPRAISAL METHODOLOGY

## 3.1 INTRODUCTION

3.1.1 This section sets out the methodology used for the AoS. An overview of the adopted approach<sup>16</sup> to the process is set out in Figure 3.1 below. This AoS report comprises Stages B & C of the process.

**Figure 3.1: Appraisal of Sustainability Process**



3.1.2 It should be noted that in practice the process is iterative and relies on feedback from formal and informal consultation as described below.

<sup>16</sup> Government Guidance on Sustainability Appraisal and local plans although comes from 2005 Practical Guidance on the SEA Directive <http://planningguidance.communities.gov.uk/blog/guidance/strategic-environmental-assessment-and-sustainability-appraisal/sustainability-appraisal-requirements-for-local-plans>.

## 3.2 STAGE A: SCOPING

3.2.1 The activities to deliver Stage A: *setting the context and objectives, describing the baseline and deciding on scope*, known as ‘scoping’, are set out in Table 3.1 below.

**Table 3.1: Summary of Scoping Activities Undertaken**

Activity	Description	Section of the Scoping Report
Identify other relevant policies, plans and programmes, and sustainability objectives	The proposed policy may be influenced in various ways by other plans or programmes, or by external environmental protection objectives such as those laid down in policies or legislation.  This activity identifies potential synergies and any inconsistencies and constraints.	Appendix A and summarised in Section 3.
Collect baseline information	Baseline information and the predicted future baseline provides the basis for predicting and monitoring environmental effects and helps to identify existing environmental problems which may be exacerbated by the proposed policy.	Appendix B and summarised in Section 4.
Identify sustainability issues and problems	Identifying environmental problems is an opportunity to define key issues and focus the SA objectives.	Appendix B and summarised in Section 4.
Develop the sustainability appraisal framework	AoS objectives are a recognised way of considering the environmental effects of a policy, plan or programme and comparing the effects of alternatives.  The AoS objectives are derived from environmental objectives which are established in law, policy, or other plans or programmes, and/or from a review of baseline information and environmental problems as identified above.  The AoS framework sets out how these will be used for assessment at the next stage, including sources of information.	Section 5.
Consult the consultation bodies on the scope of the sustainability appraisal report	The DfT must seek the views of the Consultation Bodies on the scope and level of detail in the AoS. Consultation at this stage helps to ensure that the AoS will be robust enough to support the policy during the later stages of full public consultation.	Appendix C.  Consultation undertaken 09/03/16 – 18/04/16

3.2.2 Further information relating to the development of the appraisal framework is provided in Section 4. Responses from the consultation bodies are set out in Appendix C. Should the Airports NPS be designated, a Post Adoption Statement will be published to show how environmental considerations and consultation responses have been taken into account.

3.2.3 The main areas of comments related to:

- Environmental policies, plans and programmes (PPPs) including use of the National Planning Policy Framework (NPPF).
- Recommended changes to key sustainability issues identified during baseline review (see Table 4.1).

- Recommended changes to the Appraisal Framework (see Table 4.2)
- Additional sources of guidance and information for use in the AoS.
- Identification of potential impacts and mitigation to be considered in the AoS.

## STEERING GROUP

3.2.4 It should be noted that in addition to the statutory scoping stage described above, the development of the AoS has been overseen by a Steering Group set up by DfT. In addition to policy leads within DfT, the Steering Group comprised representatives from other Government Departments (Department for Environment, Food & Rural Affairs (Defra), Department for Business, Energy and Industrial Strategy (BEIS), Ministry of Housing, Communities and Local Government (MHCLG) and Agencies in an advisory capacity (Environment Agency, Natural England, Historic England, Public Health England). Engagement with the Steering Group has been undertaken throughout the process, from scoping to subsequent assessment and reporting set out below.

## 3.3 STAGE B: DEVELOPING AND REFINING ALTERNATIVES AND ASSESSING EFFECTS

### TEST POLICY OBJECTIVES AGAINST AOS FRAMEWORK

3.3.1 The NPS references the Government's current policy on wider aviation issues, which is currently set out in the 2013 Aviation Policy Framework (APF)<sup>17</sup>. The APF sets out the high level objectives and policies for aviation and its role in driving growth, creating jobs and facilitating trade whilst at the same time addressing a range of local environmental impacts. The framework and high level priorities for the sector set out in the APF include:

- The growth and benefits that aviation brings to the UK economy;
- The importance of tackling the climate change impacts of aviation, ensuring that the sector makes a significant but cost-effective contribution towards reducing global emissions;
- Aiming to limit and, where possible, reduce the number of people significantly affected by aircraft noise;
- The importance of collaborative working between industry and local stakeholders to deliver aviation objectives; and
- The implications for planning, including the possibility of this NPS in response to a recommendation from the AC.

3.3.2 A further APF objective is to ensure that the UK's air links continue to make it one of the best connected countries in the world, including increasing our links to emerging markets so that the UK can compete successfully for economic growth opportunities. The Airports NPS, which sets out Government's policy on capacity expansion via its preferred airport scheme, supports this objective.

3.3.3 Further Government policy relating to airports has been set out in the APF, published in 2013. The Airports NPS does not affect government policy on wider aviation issues, for which the 2013 APF and any subsequent policy statements still apply<sup>18</sup>.

3.3.4 The AoS has therefore not undertaken an assessment of the objectives of the APF as these are outside of the scope of influence of the Airports NPS.

<sup>17</sup> <https://www.gov.uk/government/publications/aviation-policy-framework>

<sup>18</sup> This includes changes to UK airspace policy in the Government response to the consultation, *UK airspace policy: a framework for balanced decisions on the design and use of airspace*.

## DEVELOP THE LIKELY ALTERNATIVES

- 3.3.5 Section 4 of this report describes the process undertaken to determine ‘reasonable alternatives’ to the Airports NPS. These are referred to as ‘schemes’ within the AoS.

## EVALUATE THE LIKELY EFFECTS OF THE POLICY AND ALTERNATIVES.

- 3.3.6 An appraisal of likely significant effects has been undertaken for all the schemes and the preferred scheme. The assessment of the scheme alternatives is based on proposals submitted to the AC and government and is presented in Appendix A and summarised in section 6 of this report. The preferred scheme selected for the Airports NPS is assessed in section 7 and is based on the contents the Airports NPS.
- 3.3.7 When determining the likely significance of effects on the environment, the criteria in Schedule 1 (Regulations 9(2)(a) and 10(4)(a)) and Schedule 2(6) (Regulation 12(3)) of the SEA Regulations have been applied<sup>19</sup>.
- 3.3.8 Schedule 1 of the Regulations relates to the characteristics of plans and programmes including the degree to which the plan or programme sets a framework for projects; influences other plans and programmes; the integration of environmental considerations in particular with a view to promoting sustainable development; environmental problems; and relevance of the plan or programme for the implementation of European legislation on the environment.
- 3.3.9 The Airports NPS sets the framework for the development of a major infrastructure project and will influence other plans and programmes, specifically local land use plans and local transport plans. The Airports NPS provides the opportunity to integrate environmental considerations into the decision-making process and to address environmental problems. The Airports NPS is linked to the implementation of European legislation such as Emissions Trading Scheme, Habitats Directive; Waste, Water and Air Quality Directives. These are discussed in the assessment in relation to the relevant topic.
- 3.3.10 Likely significant effects include, as set out in Schedule 2 (Regulation 12(3)6) of the SEA Regulations, secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects.
- 3.3.11 When determining the likely significance of effects on the environment, the criteria in Schedule 1 (Regulations 9(2)(a) and 10(4)(a)) of the SEA Regulations relating to the characteristics of the effects have been applied. These include:
- 2(a) The probability, duration, frequency and reversibility of the effects;
  - (b) The cumulative nature of the effects;
  - (c) The transboundary nature of the effects;
  - (d) The risks to human health or the environment (for example, due to accidents); and
  - (e) The magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected).
- 3.3.12 Definitions of the terms which have been applied to the assessment are set out in Table 3.2 below. Where topic specific assessment criteria have also been applied, these are set out in Appendix A.

<sup>19</sup> It should be noted that Schedule 1 is for use at the screening stage in the Regulations (i.e. in establishing whether a plan/programme is likely to have significant effects) but can also be used when considering an effect in SEA (ODPM, 2005, *A Practical Guide to the SEA Directive*, para 5.B.13).

3.3.13 There are also additional criteria in Schedule 1 relating to the area affected. These are taken into account in the baseline and identification of receptors in the effect:

- 2(f) The value and vulnerability of the area likely to be affected due to -
- (i) Special natural characteristics or cultural heritage;
  - (ii) Exceeded environmental quality standards or limit values; or
  - (iii) Intensive land-use; and
- (g) The effects on areas or landscapes which have a recognised national, Community or international protection status.

**Table 3.2: Terms used to Identify and Describe Significant Effects in the AoS**

Description of the Effect	Definition for the AoS
<b>Direct / Indirect</b>	Distinguishes between effects that are a direct result of the policy (e.g. land loss) or are secondary, they occur away from the original effect or as a result of a complex pathway.
<b>Cumulative Effect</b>	Cumulative effects arise, for instance, where several developments each have insignificant effects but together have a significant effect; or where several individual effects of the plan (e.g. noise, dust and visual) have a combined effect. Includes synergistic effects where interactions produce a total effect greater than the sum of the individual effects.  Cumulative effects are also taken to mean 'in-combination effects' under the Habitats Directive, where other plans or projects in combination with the Policy might affect European sites.
<b>Risk</b>	The threat of harm or damage to receptors is stated in text where risk has been identified.
<b>Duration</b> <b>Short-term:</b> <b>Medium-term</b> <b>Long-term:</b>	 0 – 5 years (e.g. Construction period) 5 - 10 years (e.g. beyond construction or for part of operational period) 10+ years (e.g. Operation period, 60 year design life)
<b>Frequency</b>	Continual  Defined by number of occurrences (e.g. per annum)  Intermittent
<b>Probability</b>	Very Low e.g. <20% unlikely that a receptor will be affected or effect will occur based on available evidence.  Low e.g. 20-40%  Medium e.g. 40-80%  High e.g. >80% e.g. highly likely that a receptor will be affected or effect will occur based on available evidence.
<b>Permanent</b> <b>Temporary</b>	e.g. arising from infrastructure or continual effects from traffic  e.g. during construction.

**Table 3.2: Terms used to Identify and Describe Significant Effects in the AoS**

Description of the Effect	Definition for the AoS
<b>Reversible</b>	The receptor can return to (future) baseline condition without significant intervention, e.g. management or operational measures.
<b>Irreversible</b>	The receptor would require significant intervention to return to (future) baseline condition, e.g. infrastructure improvements.
<b>Spatial Extent</b>	International / Transboundary - Effects extending beyond the UK
<b>Transboundary</b>	National - Effects within England or the UK but extending beyond region
<b>Magnitude</b>	Regional - Effects within South East England or extending beyond Local
	Local – Effects within a Unitary Authority or confined to the local area, typically <5km from source.
	Magnitude has been defined where applicable by professional judgement as High, Medium, Low or Very Low.

3.3.14 Based on the descriptions of the impacts given in Table 3.2 above, a judgement was made on impact significance. This is supported by detailed commentary. AoS schemes and the preferred scheme have been appraised against the AoS Objectives and Questions using the notation set out in Table 3.3:

**Table 3.3: Identification of Significant Effects in the AoS**

Identification of Significant Effects In The AoS	
++	Significant Positive effect
+	Positive effect
-	Negative effect
--	Significant Negative effect
+/-, +/-	Mixed Positive and Negative effect
?	Unknown effect
	No relationship/Neutral effect

3.3.15 It should be noted that the AC used a similar classification system to measure performance: Highly Supportive, Supportive, Neutral, Adverse and Highly Adverse. The AoS uses the terms in Table 3.3 above to identify significant effects as required by the SEA Regulations and to align with SEA Guidance<sup>20</sup>.

3.3.16 It should also be noted that schemes are assessed individually against the requirements of the SEA Regulations above. However, they are presented together to aide comparison. This means that in some cases, although the characteristics of the effect may vary, the identification of significant effects according to Tables 3.2 and 3.3 remains the same.

<sup>20</sup> Office of the Deputy Prime Minister, 2005. *A Practical Guide to the Strategic Environmental Assessment Directive*, Appendix 7. [\[online\]](#) Accessed 04/01/2016.

3.3.17 The assessment uses quantitative data generated by the AoS Framework presented in Section 4. In addition, qualitative assessment has played a large role in the AoS, and therefore professional judgement based on experience has formed an invaluable part of the AoS. This professional judgement has used applicable thresholds and indicators where available. This approach is consistent with that described by Therivel, R. (2004)<sup>21</sup>, and is recognised best practice.

3.3.18 Monetisation of impacts has not been undertaken, with the exception of economic benefits. It is acknowledged that monetary values were applied to some sustainability effects within the AC's work alongside the Business Case. However, this AoS has been undertaken separately from the business case. The AoS allows comparison of significant effects as defined by the SEA Regulations for all topics across schemes. It enables non-monetary effects to be taken into account in decision-making for the Airports NPS.

## CUMULATIVE EFFECTS

3.3.19 Cumulative effects arise, for instance, where several developments each have insignificant effects but together have a significant effect, or where several individual effects of the plan (e.g. noise, dust and visual) have a combined effect. In the context of AoS, this is also taken to include PPPs.

3.3.20 PPPs and projects which have been reviewed for cumulative effects with the AoS include:

- Other NPSs which may give rise to cumulative effects, either through transport related effects or location, particularly in the South East.
- Other major projects, not already taken into account in surface access proposals, which may give rise to cumulative effects during construction or operation.
- Local land-use plans and policies for proposed development in the local authorities relating to schemes considered.

3.3.21 The assessment of cumulative effects is presented in Section 6.

## MITIGATION AND ENHANCEMENT

3.3.22 Regulation 12(3) Schedule 2 (7) of the SEA Regulations requires the inclusion of "measures envisaged to prevent, reduce and as fully as possible offset any significant adverse effects on the environment of implementing the plan or programme".

3.3.23 These measures are often referred to collectively as 'mitigation'. The order of preference for mitigation is applied as listed in the SEA Regulations:

- Prevent or avoid;
- Reduce or minimise;
- Offset, ameliorate or compensate.

3.3.24 Mitigation measures for the Airports NPS could include<sup>22</sup>:

- Inclusion of new provisions or changes to policy wording;
- Technical measures to be applied during the implementation stage; and
- In addition to mitigation, opportunities for environmental enhancement improvement of current environmental conditions and features should be sought.

<sup>21</sup> Therivel, R., 2004. *Strategic Environmental Assessment in Action*. Eartscan: London.

<sup>22</sup> Based on; Office of the Deputy Prime Minister, 2005. *A Practical Guide to the Strategic Environmental Assessment Directive*. [\[online\]](#) Accessed 04/01/2016.

- 3.3.25 Measures which have been included in the assessment of schemes and the preferred scheme are set out for each topic in Appendix A. These include:
- Elements of schemes design put forward by the promoters such as landscaping or areas for flood management.
  - Operational aspects put forward by promoters such as application of public transport or respite flight patterns.
  - Application of topic specific legislation and policy (e.g. NPPF) to project level development such as protected species surveys and archaeological investigation.
  - Established best practice during construction which can reasonably be applied to development of infrastructure projects.
- 3.3.26 Further mitigation has been proposed for all identified potential significant effects and any uncertainties. In addition, mitigation measures have also been proposed for other effects identified specifically to deal with issues raised by the statutory bodies. This also includes recommendations for further assessment or mitigation to be developed during subsequent project design and associated EIA. Mitigation to be considered for alternatives during project development is set out for each topic in Appendix A. This includes recommendations made by the AC and any additional measures identified during the AoS process.
- 3.3.27 Mitigation for the preferred scheme is described in Section 7.

## MONITORING

- 3.3.28 Part 4, Post-Adoption Procedures (17) of the SEA Regulations sets out monitoring requirements and states;
- “(1) The responsible authority shall monitor the significant environmental effects of the implementation of each plan or programme with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action.”*
- “(2) The responsible authority’s monitoring arrangements may comprise or include arrangements established otherwise than for the express purpose of complying with paragraph (1).”*
- 3.3.29 During this stage, measures to monitor the predicted significant environmental effects and any uncertainties which have been identified through the AoS are proposed. Monitoring needs to consider the baseline and the beneficial, cumulative, secondary and synergistic effects over the policy’s lifespan.

## ASSUMPTIONS AND LIMITATIONS

- 3.3.30 Assumptions and limitations for each of the topic based assessments are set out in Appendix A. Assumptions and limitations common to all topics which apply to this AoS are set out below:
- The parameters for the assessment of alternatives are set out in Section 5 of this report and are based on the Sustainability Appraisal undertaken by the AC, including source documents.
  - The information used for a strategic level assessment needs to be appropriate to the contents and level of detail in the Airports NPS and therefore is largely desk-based and less detailed than the information required to determine a planning application. The information used is sufficient to identify significant effects to support decision-making and adoption of the proposed Airports NPS.
  - In some cases the effects identified are generic due to lack of specific project information (such as ancillary development), detailed baseline assessment (such as heritage significance

of individual sites) or analysis (such as the 'zone of visual influence' for landscape). However this is appropriate to a strategic level assessment and will be addressed at the EIA stage.

- The assessment assumes that legislative requirements and measures proposed by the promoter will be undertaken in each topic based assessment. Additional options for mitigation are also set out, although it is not yet known what package will be implemented.
- Where the nature of an effect or effectiveness of mitigation is uncertain, a precautionary principal is applied. The effect is either determined to be 'significant' or 'uncertain' at the strategic level and therefore a mitigation and monitoring package would need to be applied.
- It is acknowledged that as the preferred scheme develops, further information will become available and the assessment will be refined by the promoter.

### 3.4 STAGE C: PREPARE THE AOS REPORT

3.4.1 This report documents the AoS process outlined in Stage B above and includes any changes from the scoping stage. It assesses alternatives and includes an assessment of preferred policy. It sets out mitigation and monitoring for significant effects identified.

3.4.2 It should be noted that Stages B and C for this AoS used information produced by the AC following an assurance process. This avoided duplication of valuable work undertaken as part of the AC's Sustainability Appraisal. However, some additional work was undertaken as part of the AoS as set out in Table 3.4 below.

**Table 3.4: Summary of Additional Studies undertaken for the AoS**

Topic	Summary of Additional Studies for the AoS
Community	To supplement the information available in the outlined documents, borough and ward level Census data (ONS, 2011) has been used to provide socio-economic and demographic data within each community area affected by each scheme (particularly Indices of Multiple Deprivation (IMD) data, data on job seeker's allowance claimants with disabilities, and race and religion statistics).
Quality of Life	A Health Impact Analysis (HIA) which assessed all three schemes was undertaken to help inform Quality of Life, including a literature review and greater understanding of impacts of airports over time.
Economy	Additional current Baseline data was provided, including recent Bank of England and Office for Budgetary Responsibility economic forecasts, and Ordnance Survey data. Informed by the <i>Updated Appraisal Report</i> <sup>23</sup> undertaken by the DfT
Noise	The significance of environmental effects was defined in relation to the application of national noise policy. The range of assessment scenarios was reduced to represent the most comparable schemes and sensitivity tests have been conducted to determine the effect of adopting different effects thresholds and scenario assumptions. The impacts of noise exposure on human health have been considered.
Biodiversity	The Habitats Regulations Assessment (HRA) process was repeated and documented separately, including screening and assessment stages. Additional information including air quality data was collected to inform the HRA.
Water	A desk based review of ecological sites on a catchment level was undertaken to look at the impact it will have on the water features upstream and downstream. The Water Framework Directive (WFD) Assessment was updated in relation to 2021 and 2027 targets.

<sup>23</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report (part of this consultation)*

**Table 3.4: Summary of Additional Studies undertaken for the AoS**

Topic	Summary of Additional Studies for the AoS
Soil	A review of Sites of Special Scientific Interest & Regionally Important Geological Sites was undertaken for sites of geological importance.
Air Quality	Air Quality Reanalysis was undertaken to assess impacts against 2015 Air Quality Plan. This was revised to reflect updated evidence on vehicle emissions and further updated to reflect the 2017 Air Quality Plan.
Carbon	Sensitivity analysis was undertaken by DfT to identify carbon abatement measures to address the carbon emission from the highest passenger demand scenario.
Resources and Waste	None
Historic Environment	An updated search of Historic Environment Records (HER) data will be required to assess impact on undesignated sites. A study area was agreed up to 300m from the masterplan boundary. A search of the Heritage at Risk Register was undertaken to identify sites already at risk.
Landscape	Inclusion of a desk study to determine whether any National Trails or other nationally important recreational facilities are affected within 15 km. Desk study to check that local landscape assessments used are up to date. Desk study also included updated information from the National Character Assessment and updated information on AONBs through desk top review.

## 3.5 STAGE D: CONSULTATION ON THE AOS REPORT

- 3.5.1 Part 3 (13) of the SEA Regulations states that “Every draft plan or programme for which an environmental report has been prepared in accordance with regulation 12 and its accompanying environmental report (“the relevant documents”) shall be made available for the purposes of consultation”
- 3.5.2 In accordance with Regulation 13(2), the consultation should be undertaken ‘As soon as reasonably practicable after the preparation of the relevant documents’ and the responsible authority shall:
- “(a) send a copy of those documents to each consultation body”;
  - “(b) take such steps as it considers appropriate to bring the preparation of the relevant documents to the attention of the persons who, in the authority’s opinion, are affected or likely to be affected by, or have an interest in the decisions involved in the assessment and adoption of the plan or programme concerned, required under the Environmental Assessment of Plans and Programmes Directive (“the public consultees”)”;
  - “(c) inform the public consultees of the address (which may include a website) at which a copy of the relevant documents may be viewed, or from which a copy may be obtained”;
  - “(d) invite the consultation bodies and the public consultees to express their opinion on the relevant documents, specifying the address to which, and the period within which, opinions must be sent”. Regulation 3 progresses to include that this period should be “of such length as will ensure that the consultation bodies and the public consultees are given an effective opportunity to express their opinion on the relevant documents”.
- 3.5.3 Under Part 3 Regulation 14, where a responsible authority is “of the opinion that a plan or programme for which it is the responsible authority is likely to have significant effects on the environment of another Member State, it shall, as soon as reasonably practicable after forming that opinion”:

- “(a) notify the Secretary of State of its opinion and of the reasons for it”; and
- “(b) supply the Secretary of State with a copy of the plan or programme concerned, and of the accompanying environmental report”.

### 3.5.4

The AC has undertaken a number of consultations to date. These have covered a range of environmental, social and economic impacts, as well as assessments of operational and commercial viability and of deliverability. Those most relevant to the AoS process are summarised in Table 3.5 below.

**Table 3.5: Summary of Consultation**

Consultation	Description of consultation
<b>Consultation relating to Sustainability Appraisal undertaken by the AC</b>	
Discussion Papers	In July 2013 the AC published discussion papers <sup>24</sup> on various topics, including aviation noise, aviation and climate change, and aviation connectivity and the economy. This was to encourage public and stakeholder engagement to inform assessment of the UK's airport capacity needs.
Aviation Capacity in the UK: emerging thinking	In December 2013 the AC published a wide range of stakeholder consultation outcomes. The AC's emerging thinking set out a number of key arguments made against expanding aviation capacity in the UK. This process elicited 85 technical and 23 non-technical consultation responses.
Delivering new runway capacity: call for evidence	This discussion paper called for evidence between 1 July 2014 to 15 August 2014 on issues which the AC has identified as being of interest to the delivery of new runway capacity.
Inner Thames Estuary	The environmental impacts study was published for consultation on 04/07/2014, and the remaining 3 studies in relation to surface access impacts, socio-economic impacts and operational feasibility and attitudes to moving to a new airport were published on 10/07/2014.  Consultation closed on 08/08/2014 and a decision was issued on 02/09/2014 not to add the inner Thames estuary airport proposal to the shortlist of schemes for providing new airport capacity by 2030 <sup>25</sup> .
Appraisal Framework	The AC published its 'Draft appraisal framework' for use as the basis of its assessments of the 3 shortlisted schemes and this was consulted on between 16/01/2014 – 28/02/2014. The finalised 'Appraisal framework' was published in 02/04/2014 <sup>26</sup> .
Short-listed Schemes Appraisal	Consultation on the AC's assessment of proposals for additional runway capacity at Gatwick and Heathrow airports including sustainability appraisal ran from 11/11/2014 - 03/02/2015 <sup>27</sup> .
Air quality assessment	This consultation sought views on new evidence relating to the air quality assessment of the 3 short-listed schemes, with consultation running from 8/5/2015 – 29/05/2015.
<b>Consultation for this AoS</b>	
AoS Scoping Report	Consultation with the Consultation Bodies (Natural England, Historic England and the Environment Agency) ran from 09/03/16-18/04/16 on the scope of the AoS (see Stage A above).

<sup>24</sup> Airports Commission, 2013. *Discussion papers*. [\[online\]](#) Accessed 15/08/2015.

<sup>25</sup> Airports Commission, 2014. *Airports Commission announces inner Thames estuary decision*. [\[online\]](#) Accessed 01/08/2015.

<sup>26</sup> Airports Commission, 2014. *Airports Commission: appraisal framework*. [\[online\]](#) Accessed 01/08/2015.

<sup>27</sup> Airports Commission, 2014. *Increasing the UK's long-term aviation capacity*. [\[online\]](#) Accessed 01/08/2015.

**Table 3.5: Summary of Consultation**

Consultation	Description of consultation
AoS Report	Consultation on this AoS and the Airports NPS was undertaken as part of the AoS process: for the Draft Airports NPS, February to May 2017 and the Revised Airports NPS, October to December 2017.

## 3.6 STAGE E: POST ADOPTION AND MONITORING

3.6.1 Stage E promotes and undertakes the monitoring of potential significant effects and uncertainties of the implementation of the policy with the purpose of identifying unforeseen adverse effects at an early stage and being able to undertake appropriate remedial action. Monitoring is proposed in Table 7.4 in Section 7 and Next Steps to implementation set out in Section 8.

## 3.7 RELATIONSHIP WITH OTHER PROCESSES

3.7.1 An AoS is not undertaken in isolation and there are a number of other statutory and non-statutory processes which assess sustainability aspects. These are summarised in Table 3.6 below.

**Table 3.6: Relationship between the AoS and other Processes**

Assessment and legislation	Description	Relationship to this AoS
Habitats Regulations Assessment (HRA), Habitats Directive 92/43/EEC	There is a requirement under the Habitats Directive to consider effects on sites of European importance for Nature Conservation. HRAs start with a screening stage, which determines whether more detailed study is required through an 'Appropriate Assessment'.  Although HRA is a separate process, information can be exchanged to inform both processes.	An initial HRA 'screening' for likely significant effects on European sites has been undertaken for the 3 short-listed schemes as part of the AC's work <sup>28</sup> .  Re-screening has been undertaken alongside the AoS, further 'Appropriate Assessment' has also been undertaken.  The AoS provides information on potential effects for the HRA and is informed in relation to effects on biodiversity by the HRA.

<sup>28</sup> Jacobs, 2014. 7. *Biodiversity: Assessment*. [online] Accessed 05/01/2016.

**Table 3.6: Relationship between the AoS and other Processes**

Assessment and legislation	Description	Relationship to this AoS
Environmental Impact Assessment (EIA) EIA Directive 2014/52/EU	The EIA Directive requires that the likely significant environmental effects of a project are assessed and taken into account prior to consent for development. AoS would be undertaken prior to or in parallel with EIA. Information can be exchanged to inform both processes.	EIA will be required in conjunction with the consenting process for the preferred scheme. This will be carried out by the scheme applicant. The AoS will provide information on alternatives considered, baseline, potential significant effects and options for mitigation.
Equalities Impact Assessment (EqIA) Equality Act 2010	Public bodies have a duty to assess the impact of their policies on different population groups to ensure that discrimination does not take place and, where possible, to promote equality of opportunity. EqIA is a separate process and the AoS can provide information to support the assessment.	A high level screening for EqIA was undertaken by the AC <sup>29</sup> . The AoS can provide information on potential effects for the EqIA and the EqIA can provide information on the community issues for the AoS.
Health Impact Assessment / Analysis (HIA) Health considerations are a requirement of the SEA Regulations although HIA process is non-statutory	HIA should produce evidence-based practical recommendations that should help to improve health and reduce health inequalities. HIA is a separate process and the AoS can provide information to support the assessment.	The AoS can provide information on potential effects for the HIA and the HIA can provide information on health effects for the AoS.
Web-based Transport Analysis Guidance (WebTAG) Non-statutory process	WebTAG is DfT's transport appraisal guidance and toolkit. It consists of software tools and guidance on transport modelling and appraisal methods that are applicable for highways and public transport interventions. These facilitate the appraisal and development of transport interventions, enabling analysts to build evidence to support business case development, to inform transport projects that require government approval <sup>30</sup> .	Modelling and appraisal of the economic, environmental and social impacts has been informed by guidance and technical methods provided in WebTAG.
Ecosystem Services Assessment (ESA) Non-statutory process	The ecosystem services approach considers the environment in terms of the benefits it brings to people. It identifies different ecosystems such as farmland and woodland, and then identifies the different services that these provide such as food production, regulation of flood risk, amenity value and pollution control.	An ESA was undertaken by the AC <sup>31</sup> . Further work on the ESA is not being undertaken at the strategic level. However, the AoS recommends that further assessment of impacts on ecosystem services and identification of mitigation is undertaken at project level.

<sup>29</sup> Airports Commission, 2014. *Community: Impact Assessment* [online]. Accessed 01/08/2015.

<sup>30</sup> Department for Transport, 2014, *Transport Analysis Guidance* [online] Accessed 19/04/2016.

<sup>31</sup> Jacobs, 2014, 7. Biodiversity, *Ecosystem Services*. [online] Accessed 05/01/2016.

# 4 SUSTAINABILITY CONTEXT AND APPRAISAL FRAMEWORK

## 4.1 INTRODUCTION

4.1.1 This section sets out the sustainability context established during scoping, through both a review of the current and future baseline, in addition to a review of relevant PPPs. Sustainability issues were identified which were used to develop the Appraisal Framework to assess the alternative schemes.

## 4.2 BASELINE

4.2.1 A review and update of the existing baseline conditions undertaken for the Scoping Report is set out in detail for each topic within the Topic Appendices (Appendix A-1-A-12). The Topic Appendices describe any existing problems or issues. It should be noted that at the policy level the baseline is comprised of desk-based information. Site based surveys are not normally undertaken at a strategic level as they can be very extensive (covering large geographic areas and long periods of time where seasonal surveys are required) and until development is better defined with design information at specific locations and timeframes can be abortive. Data sources and references for desk based studies are provided within the Appendices. The review also identified predicted future trends and issues.

4.2.2 The baseline year used for this AoS is generally 2016 unless stated otherwise (for example due to availability of data used in modelling) and is based on the work undertaken by the AC and DfT. The 2016 baseline has been supplemented in some cases by additional information where this would support the appraisal framework or would significantly affect the outcome of the appraisal. Additional data sources are identified in topic-based appraisals in the appendices. Future baseline years where applicable are set out within the temporal scope in Section 5.5 of this report.

## 4.3 POLICIES, PLANS AND PROGRAMMES

4.3.1 A review of relevant PPPs that have the potential to influence aviation capacity was undertaken at the Scoping Stage (Appendix A of the Scoping Report).

4.3.2 PPPs can act as a constraint to development, for example where formal limitations, policy contexts or requirements are stated. In addition, the review established relevant sustainability objectives within the PPPs. The review was then used to inform the consideration of key sustainability issues and development of the AoS Framework. The themes that emerged from the review are summarised below.

### OVERARCHING PPPS

4.3.3 The overarching PPPs<sup>32</sup> have the following common themes and objectives:

- Delivering sustainable development;
- Promoting sustainable economic growth and high levels of employment;

<sup>32</sup> Appendix A-1, *Appraisal of Sustainability Airports NPS: Scoping Report, March 2016* [\[Online\]](#) Accessed 20/10/17

- Protection of the environment and countryside;
- Improving quality of life for all, including future generations;
- Tackling climate change (both mitigation and adaptation);
- Promoting sustainable consumption and production including prudent use of natural resources;
- Supporting vibrant, healthy, sustainable and inclusive urban and rural communities; and
- Ensuring that communities and members of the public can make their views heard.

## ENVIRONMENTAL PPPS

4.3.4 The common objectives and themes that are found within the environmental PPPs<sup>33</sup> are as follows:

- Protecting and preserving the environment as a whole for today and the future;
- Protecting the environment as a whole and human health, by reducing emissions of atmospheric pollutants;
- Promoting the 'Polluter Pays Principle';
- Reducing greenhouse gas emissions;
- Tackling climate change through mitigation and adaptation;
- Protecting and enhancing biodiversity and geological diversity in the terrestrial and marine environments;
- Working towards sustainable waste management including more efficient use of natural resources;
- Promoting the use of renewable energy;
- Promoting the protection and improvement of landscape and townscape character and quality;
- Protecting land quality, including the identification and remediation of contaminated land;
- Protecting soils and Best and Most Versatile agricultural land;
- Avoiding, preventing or reducing the harmful impacts, including annoyance, due to exposure to noise;
- Protecting and improving water quality and quantity, and increasing efficiency of water use;
- Reducing and managing flood risk; and
- Conserving and enhancing significance of heritage assets, including archaeological heritage and the wider historic environment.

## ECONOMIC PPPS

4.3.5 The common objectives and themes that are found within the economic PPPs<sup>34</sup> are as follows:

- Delivering strong and sustainable economic growth;
- Full employment and greater economic productivity;
- Promoting economic competitiveness;

<sup>33</sup> Appendix A-2, *Appraisal of Sustainability Airports NPS Scoping Report, March 2016* [\[Online\]](#) Accessed 20/10/17

<sup>34</sup> Appendix A-3, *Appraisal of Sustainability Airports NPS Scoping Report, March 2016* [\[Online\]](#) Accessed 20/10/17

- Maintenance of high and stable levels of economic growth and employment;
- Promoting a low carbon economy;
- Achieving better energy security;
- Increasing the UK's international competitiveness; and
- Promoting tourism.

## SOCIAL PPPS

4.3.6 The common objectives and themes that are found within the social PPPs<sup>35</sup> are as follows:

- Promoting better health and wellbeing for all (especially vulnerable persons e.g. children and the elderly);
- Promoting physical activity;
- Tackling discrimination;
- Promoting equality and social inclusion;
- Improving accessibility;
- Increasing opportunities for all;
- Making communities safer through reduction of crime and reduction of risk from terrorism;
- Building more cohesive, empowered and active communities;
- Increasing long term housing supply and affordability; and
- Ensuring that communities and members of the public can make their views heard.

## 4.4 SUSTAINABILITY ISSUES

4.4.1 The review of the baseline and PPPs identified a set of key sustainability issues of relevance to the development of airport capacity and these are listed below (Table 4.1).

**Table 4.1: Key Sustainability Issues identified for the AoS**

AoS Topic	Key Sustainability Issues Identified for AoS
Community and Quality of Life	<p>Loss of, or increased demand for housing and community services and facilities.</p> <p>Direct or indirect effects on the future viability of distinct communities, for example due to loss of community services, facilities and housing.</p> <p>Loss of, or indirect effects on nationally important recreational facilities.</p> <p>Potential for disproportionate effects on certain social groups.</p> <p>Adverse or beneficial changes to quality of life in communities affected by airport expansion.</p>
Economy	<p>Delivery of strong and sustainable economic benefits nationally and locally.</p> <p>Sustainable growth in employment should be maximised throughout both construction and operation.</p> <p>Increase the UK's international competitiveness in a sustainable manner.</p> <p>Promote sustainable tourism.</p>
Noise	<p>Increased noise from aviation, surface transport and construction in the locality of the airports affecting increased population densities.</p>

<sup>35</sup> Appendix A-4 *Appraisal of Sustainability Airports NPS Scoping Report, March 2016* [\[Online\]](#) Accessed 20/10/17

**Table 4.1: Key Sustainability Issues identified for the AoS**

AoS Topic	Key Sustainability Issues Identified for AoS
Biodiversity	<p>Effects on statutory and non-statutory designated sites for nature conservation.</p> <p>Effects on Priority Habitats, on the connectivity between habitats and on the spaces for future growth of habitats to provide for protected species and priority species.</p> <p>Effects on ancient woodland, veteran trees, hedgerows and other habitats such as watercourses and wetlands.</p> <p>Loss of ecosystem services and valuation of these.</p>
Water	<p>Effects upon the chemical and ecological quality of waterbodies which are at risk from physical alteration, discharges, run-off and infiltration from diverse sources, and abstraction reducing dilution.</p> <p>The need to avoid deterioration and improve ecological status of waterbodies in line with the Water Framework Directive. Effects on water resources from increased use or associated with a rise in passenger numbers and other operations.</p> <p>Increased risk of flooding affecting the airport expansion schemes and other areas, e.g. downstream.</p>
Soil	<p>Effects on sites designated for geodiversity.</p> <p>Loss of soils from sealing, including impact on Best and Most Versatile agricultural land.</p> <p>Damage to soils from erosion, degradation or contamination during construction or operation.</p>
Air Quality	<p>The effects on local air quality from surface access, airport operations and aviation and how this impacts on achieving compliance with air quality requirements or legislation.</p> <p>Contributing to an increase in national emissions totals. Contributing to, or producing new exceedance of EU Ambient Air Quality Directive limit values.</p> <p>Contributing to impacts on ecosystems and to human health.</p>
Carbon	<p>Carbon emissions in relation to Carbon Reduction Commitment (CRC), European Union Emissions Trading System (EU-ETS) and Airport Accreditation Scheme.</p> <p>Emissions associated with construction activities, operation and maintenance.</p> <p>Emissions from flights leaving the UK are due to increase, although they are excluded from UK carbon budgets.</p> <p>Emissions from surface access, by passengers, staff and freight.</p>
Resources and Waste	<p>Responding to the need to maximise the use of more sustainable (recovered and low environmental impact) material resources, and minimise the consumption of virgin materials. Potential indirect effects arising from materials extraction, processing, manufacture and transportation. Generation of construction, demolition and excavation wastes, and potential indirect effects arising from transportation and off-site treatment.</p> <p>Local waste storage capacity issues and direct/indirect effects of landfill or treatment of hazardous, non-hazardous and inert wastes during construction and operation.</p>
Historic Environment	<p>Effects on the significance of designated heritage assets and their settings, including within the historic landscape or townscape.</p> <p>Indirect effects on the significance of designated assets and their settings, such as generation of traffic, air quality, and noise.</p> <p>Direct and indirect effects on the significance of non-designated heritage assets, and potential for unknown archaeological remains, and their settings.</p> <p>Potential to conserve and enhance the significance of heritage assets.</p>
Landscape	<p>Effects on designated landscapes and their setting.</p> <p>Effects on local landscape and townscape character and quality.</p> <p>Loss of tranquillity and increase in light pollution.</p>

## 4.5 APPRAISAL FRAMEWORK

- 4.5.1 This appraisal methodology for the AoS was developed during scoping to take into account that the proposed NPS would need to deliver aviation capacity in the UK and identify the location(s) where this is to take place. The scoping stage identified sustainability issues through a review of plans, policies and programmes, and also the baseline information.
- 4.5.2 The use of AoS objectives was recommended within the early guidance on undertaking SEA and SA (ODPM 2005) and is currently supported by the Planning Advisory Service (PAS) and through recognised best practice. AoS objectives are used to consider the environmental and sustainability effects of a policy, plan or programme and to compare the effects of alternatives<sup>36</sup>. The appraisal questions have been generated to direct the appraisal to address the key sustainability issues identified during the scoping stage. The assessment of significance is against the overall objective but focused by the appraisal question.
- 4.5.3 The Appraisal Framework developed during scoping for this AoS differs slightly to the framework used by the AC for their SA. Although many of the objectives and appraisal questions are similar, the framework for the AoS has been developed to incorporate the specific requirements of SEA of an NPS.
- 4.5.4 Topics covered in the AoS are guided by the requirement to consider the potential significant effects on topics as listed in Schedule 2 (6) of the SEA Regulations. These include issues such as biodiversity, population, human health, fauna, flora, soil, water, air, climatic factors, material assets, cultural heritage including architectural and archaeological heritage, landscape and the interrelationship between the above factors. The topics covered by this AoS are set out in Table 4.2 and within topic assessments in Appendix A. Potential interactions between effects are identified within each topic assessment. In addition, a number of cross-cutting themes were identified:
- Climate change - Adaptation to the effects of climate change including water scarcity and flooding has been assessed within the water topic. Mitigating the effects of climate change, including minimising greenhouse gas emissions and in particular, carbon, has been assessed in the Carbon topic. In addition, topics have taken into account the effects of climate change as part of future baseline and issues. For example, biodiversity considers the effects of climate change on ecosystems such as species adaptation and composition. In addition, the Airports NPS acknowledges that climate change, including extreme weather and heatwaves, will need to be taken into account through the development and consenting of airport infrastructure.
  - Green infrastructure - The need for green (and blue) infrastructure to be developed alongside future airport expansion is related to a number of topics. Green and blue infrastructure provides:
    - Habitats, increases connectivity and facilitates movement of species;
    - Landscape and amenity benefits for communities, contributing to quality of life;
    - Landscape for heritage interest (for example registered park and garden, part of a conservation area or contribute to setting of listed building);
    - Ecological and chemical water quality and potential flood storage/ conveyance;
    - A barrier to air pollution, dust and noise;
    - A reduction in heat island effects.

<sup>36</sup> See stage A of ODPM, 2005, *A Practical Guide to the Strategic Environmental Assessment Directive* and <https://www.cambridge.gov.uk/public/ldf/coredocs/RD-STRAT/RD-EX/rd-ex-010.pdf>

- Ecosystem services - The consideration of ecosystems such as farmland or woodland, and the different services that these provide covers a number of AoS topics such as Soils (food production, pollution control), Water (regulation of flood risk) and Landscape (amenity value). An assessment of ecosystem services was undertaken by the AC as described in Table 3.6 above. Although further assessment has not been undertaken for the AoS, references to potential impacts on ecosystem services are made in individual topics where relevant, including Soils, Carbon, Water and Biodiversity.
- Human health – Health can be affected by impacts described under several AoS topics. These include noise, air quality, flood risk and quality of life. The latter will also be influenced by effects on topics such as communities, landscape, the historic environment, economy and biodiversity.
- Noise – Noise affects human beings by impacting psychological and physiological health. It has indirect effects on communities and recreation. It also disturbs wildlife and changes the landscape and historic environment, for instance through loss of tranquillity.

Table 4.2: Appraisal of Sustainability Framework

AoS Topic (SEA Topic <sup>37</sup> )	Key issues from policy review and baseline	AoS Objectives	Appraisal Questions
Community (Population, Material Assets)	Loss of, or increased demand for housing and community services and facilities, including recreational facilities.  Indirect effects on the future viability of communities, for example due to loss of community services, facilities and housing.	1. To avoid or minimise negative effects on community viability, including housing, facilities and indirect effects.	1. Will it lead to a loss of housing and community facilities? 2. Will it lead to increasing demand for housing and community facilities? 3. Will there be indirect effects on community viability?
	The potential for disproportionate effects on certain social groups.	2. To avoid or minimise disproportionate impacts on any social group.	4. Will it minimise disproportionate negative effects on particular regions, users or vulnerable social groups?
Quality of Life (Population, Human Health)	Adverse changes to quality of life in communities affected by airport expansion.	3. To maintain and where possible improve the quality of life for local residents and the wider population.	5. Will it help to maintain and improve quality of life?
Economy	Need for strong and sustainable national economic growth and for sustainable growth in employment.  Need to increase the UK's international competitiveness and to promote sustainable growth of visitor numbers in the UK.	4. To maximise economic benefits and to support the competitiveness of the UK economy.	6. Will it enhance economic benefits? 7. Will it contribute to sustainable growth in employment? 8. Will it support the productivity of the UK economy?
	Need for sustainable local economic growth.	5. To promote employment and economic growth in the local area and surrounding region.	9. Will it incorporate accessibility improvements, particularly with key local employment centres and areas of high unemployment? 10. Will it contribute to growth in the local economy?
Noise (Human Health)	Potential for noise to adversely affect communities. Main sources of noise include construction, aviation and surface transport.	6. To minimise and where possible reduce noise impacts on human receptors.	11. Will it avoid or reduce the harmful effects including annoyance due to exposure to noise?

<sup>37</sup> Listed in Schedule 2 (6), Regulation 12(3) Information For Environmental Reports Requirements of the SEA Regulations, where applicable to the AoS Topic

Table 4.2: Appraisal of Sustainability Framework

AoS Topic (SEA Topic <sup>37</sup> )	Key issues from policy review and baseline	AoS Objectives	Appraisal Questions
Biodiversity (Biodiversity, flora and fauna)	Potential for loss and/or damage to designated sites for nature conservation and their interest features.	7. To protect and enhance designated sites for nature conservation.	12. Will it affect internationally, nationally and locally designated biodiversity sites?
	Potential for loss and/or damage to habitats, including ancient woodlands and wetlands and the species they support. Potential for indirect effects, including from surface transport and aviation. Loss of ecosystem services.	8. To conserve and enhance undesignated habitats, species, valuable ecological networks and ecosystem functionality.	13. Will it conserve and enhance undesignated habitats, internationally and nationally protected species and valuable ecological networks, such as priority habitats and priority species. 14. Will it increase the exposure of wildlife to transport noise, air pollution, and water pollution?
Soil (Soil)	Potential for loss of geodiversity.	9. To protect sites designated for geodiversity.	15. Will it preserve, protect and improve geodiversity?
	Potential for loss and damage to soil productivity from sealing (urban development), erosion, contamination and degradation.	10. To minimise loss of undeveloped soils and of Best and Most Versatile agricultural land, and protect soil against erosion, contamination and degradation.	16. Will it maximise construction on previously developed land, minimise use of greenfield and Best and Most Versatile agricultural land? 17. Will it lead to the disturbing, harm, contamination or loss of soil resources?
Water (Water)	Impacts on 'good status' and 'potential' water quality and ecological status under the Water Framework Directive. Potential for over-consumption of available water resources.	11. To protect the quality of surface and ground waters, and use water resources sustainably.	18. Will proposals have adverse effects on the achievement of the environmental objectives established under the Water Framework Directive? 19. Will it result in the modification of watercourses? 20. Will it result in the loss in productivity of fisheries? 21. Will it lead to an increase in the consumption of available water resources?

Table 4.2: Appraisal of Sustainability Framework

AoS Topic (SEA Topic <sup>37</sup> )	Key issues from policy review and baseline	AoS Objectives	Appraisal Questions
Water (Water, Climatic Factors)	An increase in flood risk and reduced risk of resilience to water related effects of climate change.	12. To minimise flood risk and ensure resilience to climate change.	22. Will it increase flood risk through increased run off? 23. Will it increase area of development within areas at risk of flooding? 24. Will it be able to adapt to climate change?
Air Quality (Air)	Increase in emissions (Nitrogen oxides and particulate matter), particularly from aviation and surface transport emissions, affecting local communities, wildlife and the built environment.	13. To improve air quality and reduce emissions consistent with EU, national and local standards and requirements.	25. Will it support compliance with local, national and European air quality requirements or legislation? 26. Will it reduce the exposure to air quality for local communities and sites designated for nature conservation?
Carbon (Climatic Factors)	Increase in carbon emissions, particularly from aviation and surface transportation sources.	14. To minimise carbon emissions in airport construction and operation.	27. Will the approach to the development be consistent with overall carbon requirements? 28. Will the approach minimise carbon emissions associated with surface transportation?
Resources and Waste (Material Assets)	Consumption of natural resources during construction and operation.	15. To minimise consumption of natural, particularly virgin non-renewable, resources.	29. Will it be possible to minimise the consumption of natural resources?
	Generation of waste during construction and operation. Direct and indirect effects from off-site and on-site management of materials and waste (including separation of biodegradable and residual waste) during construction and operation.	16. To minimise the generation of waste in accordance with the principals of the resource efficiency hierarchy.	30. Will it be possible to minimise waste generated during construction and operation?

Table 4.2: Appraisal of Sustainability Framework

AoS Topic (SEA Topic <sup>37</sup> )	Key issues from policy review and baseline	AoS Objectives	Appraisal Questions
Historic Environment (Cultural Heritage)	<p>Loss or harm to the significance of designated heritage assets and their settings, from physical works or indirectly, e.g. through surface transport or aviation noise.</p> <p>Loss or harm to the significance of non-designated heritage assets and their settings, from physical works or indirectly e.g. through surface transport or aviation noise.</p> <p>Potential to conserve and enhance the significance of heritage assets.</p> <p>Potential <u>direct and indirect</u> effects on the historic landscape and townscape.</p>	17. Conserve and where appropriate enhance heritage assets and the wider historic environment including buildings, structures, landscapes, townscapes and archaeological remains.	<p>31. Will it affect the significance of internationally and nationally designated heritage assets and their settings?</p> <p>32. Will it affect the significance of non-designated heritage assets and their settings?</p> <p>33. Will it conserve or enhance heritage assets and the wider historic environment including landscapes, townscapes, buildings, structures, and archaeological remains?</p> <p>34. Will it harm the significance of heritage assets for example from the generation of noise, pollutants and visual intrusion?</p>
Landscape (Landscape)	<p>Effects on nationally or locally designated landscapes, townscapes or waterscapes from new development.</p> <p>Effects on local landscape, waterscape and townscape character and quality.</p> <p>Loss of tranquillity and increase in light pollution.</p>	18. To promote the protection and improvement of landscapes, townscapes, waterscapes and the visual resource, including areas of tranquillity and dark skies.	<p>35. Will it protect and enhance nationally and locally designated landscape, townscape and waterscape?</p> <p>36. Will it lead to impact on sensitive views?</p> <p>37. Will it lead to a loss of tranquillity and increase in light pollution?</p>

# 5 DEVELOPMENT OF ALTERNATIVES

## 5.1 INTRODUCTION

5.1.1 This section justifies the ‘reasonable alternatives’ under the SEA Regulations to be assessed in this report. This draws on the work undertaken by the AC to reach a short-list of the most credible schemes.

5.1.2 The spatial scope and temporal scope of the alternatives to be assessed in the AoS will be defined according to the criteria listed below:

- Factors affecting the temporal scope of the assessment: Timeframe for planning, construction and operational design life; and
- Factors affecting the spatial scope of the assessment: Masterplan footprint; surface access; and operational airspace.

## 5.2 DEFINING REASONABLE ALTERNATIVES

5.2.1 The SEA Practical Guide includes a hierarchy of alternatives.<sup>38</sup> These are set out in Table 5.1 below. The scheme selection process is set out in more detail in Sections 5.3 and 5.4.

**Table 5.1: Hierarchy of Alternatives**

Hierarchy of Alternatives	How this is addressed
Need or demand – is it necessary?	<p>The UK aviation sector plays an important role in the modern economy, contributing around £20bn per year and directly supporting approximately 230,000 jobs. The positive impacts of the aviation sector extend beyond its direct contribution to the economy, by also enabling activity in other important sectors like business services, financial services and the creative industries. The UK has the third largest aviation network in the world, and London’s airports serve more routes than any other European city.</p> <p>However, London and the South East is now facing longer term capacity problems. Heathrow is operating at full capacity today, and all major South East airports<sup>39</sup> are expected to be full by the mid-2030s, with 4 out of 5 full by the mid-2020s. There is still spare capacity elsewhere in the South East for point to point and especially low cost flights, but with no availability at Heathrow Airport London is beginning to find that new routes to important long haul destinations are being set up elsewhere in Europe. This is having an adverse impact on the UK economy, and affecting the country’s global competitiveness.</p> <p>The Government believes that non-expansion will impose costs on passengers and on the wider economy. The AC estimated that direct negative impacts to passengers, such as fare increases and delays, would range from £21-23bn. Without expansion, constraints in the aviation sector impose increasing costs on the rest of the economy over time, lowering economic output by making aviation more expensive and less convenient to use, with knock-on effects in lost trade, tourism and foreign direct investment.</p>

<sup>38</sup> Office of the Deputy Prime Minister, 2005. *A Practical Guide to the Strategic Environmental Assessment Directive*, p. 69. [\[online\]](#) Accessed 05/01/2016.

<sup>39</sup> Defined as Gatwick, Heathrow, London City, Luton and Stansted

Table 5.1: Hierarchy of Alternatives

Hierarchy of Alternatives	How this is addressed
Mode or process – how should it be done?	The AC explored potential alternatives <sup>40</sup> to additional runway capacity, which included (1) redistribution methods <sup>41</sup> , (2) investment in High Speed Rail and improved surface access schemes, and (3) new technologies. The AC found that none of these schemes delivered a sufficient increase in capacity and many required investment far in excess of the cost of runway expansion.
Location – where should it go?	Two potential sites were selected for new runway infrastructure, Gatwick and Heathrow (see section 5.4 below). The conclusions presented in the AC's Interim Report found that aviation demand is likely to increase significantly between now and 2050. All major South East airports <sup>42</sup> are now expected to be full by the mid-2030s, and by 2050, demand at these airport is expected to outstrip capacity by 34%, even on the lowest demand forecasts <sup>43</sup> . There is relatively little scope to redistribute demand away from the South East to less heavily utilised capacity elsewhere in the country.
Timing and detailed implementation	The AC concluded that there is a clear case for one net additional runway in London and the South East, to come into operation by 2030.

## 5.3 PHASE 1 – IDENTIFYING A 'LONG LIST' OF SCHEMES

5.3.1 The AC Interim Report<sup>44</sup> describes the approach to identifying a long list of schemes for alleviating future aviation capacity problems.

5.3.2 The AC initially invited parties interested in developing proposals to send a notification of intention in February 2013. This process was designed to supplement the AC's provisional list of schemes, and to identify any gaps in the schemes under consideration. The AC received 52 proposals in total (Interim Report<sup>45</sup>). The 52 submissions included schemes for building new airports, for expanding existing single runway airports into large multi-runway hubs, and for the incremental expansion of existing airports. Also included were a number of alternative transport improvements, which would not involve any expansion of aviation infrastructure. In addition to the 52 submissions, the AC identified a further 6 schemes for new runways, or expansion or reconfiguration of capacity at existing airports. The total number of long listed proposals was 58.

5.3.3 The AC undertook a staged process to sift the schemes for more detailed assessment. The methodology and sift criteria that the AC used for sifting the long list is described in the Airports Commission Interim Report, Appendix 2: Assessment of Long-term Options<sup>46</sup> and Appendix 2: Assessment of Long-term Options<sup>47</sup>. These stages are as follows:

- Consult on draft sift criteria and publish final sift criteria;
- Consultation on proposed schemes, and publication of results;
- Initial Sift, including completion of assessment templates, sifting out proposals and identification of 'do nothing' scenario;

<sup>40</sup> Airports Commission, 2015. *Final Report*, p84. [\[online\]](#) Accessed 06/01/2017.

<sup>41</sup> For example, changing the rate of Air Passenger Duty (APD), changing the slot allocation regime, Traffic Distribution Rules, and prohibiting certain types of flights

<sup>42</sup> Heathrow, Gatwick, Stansted, London City, Luton

<sup>43</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report*

<sup>44</sup> Airports Commission, 2013. *Interim Report*, Section 6.6, and Appendix 2. [\[online\]](#) Accessed 01/08/2015.

<sup>45</sup> Airports Commission, 2013. *Interim Report*, Appendix 2: Assessment of Long-term Options, Section 3.1 [\[online\]](#) Accessed 05/01/2016.

<sup>46</sup> Airports Commission, 2013. *Interim Report*, Appendix 2: Assessment of Long-term Options, p. 7. [\[online\]](#) Accessed 05/01/2016.

<sup>47</sup> Airports Commission, 2013. *Appendix 2: Assessment of Long-term Options*. [\[online\]](#) Accessed 21/03/2016

- Second Sift, including consideration of views on schemes and grouping of remaining schemes, and identification of surface access proposals;
- Final Sift, involving further assessment of remaining proposals against sift criteria; and
- Final assessment and recommendations for long list of schemes reported.

5.3.4 Stages 3, 4 and 5 involved a consideration of the schemes against various criteria used to identify schemes which did not merit more detailed assessment and could be removed from consideration. Stage 3, the first sift, was based on high-level information provided in relation to each proposal. During this initially sift, three key criteria to test the suitability of the proposal were used by the Commission. During Stage 4 and 5 (second and final sift), the proposals were sifted by the Commission using a second, more detailed set of criteria which are listed below in Table 5.2. This second sift developed the information considered by independently analysing the proposals. The final sift assessed the remaining proposals in more detail and additional analysis was carried out. This sifting was based on the Commissions publication ‘Guidance Document 02: Long Term Capacity Options: Sift Criteria’<sup>48</sup>, which identified the sift criteria that the commission used to assess submissions. The sift process and schemes considered are described below.

**Table 5.2: Long Term Schemes Criteria**

Long-Term Schemes Criteria	
Strategic Fit	<ul style="list-style-type: none"> <li>→ What is the nature, scale and timing of the aviation capacity and connectivity delivered by the proposal? How will the proposal support or enhance the UK’s status as Europe’s most important aviation hub?</li> <li>→ Does the proposal support the Government’s wider objectives and legal requirements (for example, support of national and regional economic growth, re-balancing of the economy or alignment with national climate change commitments and global targets)?</li> </ul>
Economy	<ul style="list-style-type: none"> <li>→ What are the potential national economic impacts of the proposal?</li> <li>→ What are the likely impacts of the proposal on the regional/local economies surrounding a) the proposed site for new or enhanced capacity and b) other airports affected by the proposal?</li> <li>→ What is the likely impact of the proposal on the UK aviation industry? How will other airports be affected by the proposals and what will the impacts of this be for air passengers and other users, airlines and the wider economy?</li> </ul>
Surface Access	<ul style="list-style-type: none"> <li>→ What estimate has been made of the surface access requirements of the proposal in relation to existing and new infrastructure?</li> <li>→ Does the proposal provide effective surface access for passengers, businesses and relevant freight traffic? <ul style="list-style-type: none"> <li>■ Will surface access plans provide the capacity needed for expected future demand?</li> <li>■ How does the proposal impact upon local traffic and congestion?</li> <li>■ What is the expected surface access split between public and private transport?</li> </ul> </li> <li>→ How will the proposal change journey times from major business and population centres for users of aviation services?</li> </ul>

<sup>48</sup> Airport Commission, 2013. *Guidance Document 02: Long Term Capacity Options: Sift Criteria*. [\[online\]](#) Accessed 05/01/2016.

Table 5.2: Long Term Schemes Criteria

Long-Term Schemes Criteria	
Environment	<p><i>Air Quality:</i></p> <p>→ What are the air quality implications of the proposal (including impacts due to aircraft, air side operation and local surface transport links)? Are these consistent with the legal frameworks for air quality? What mitigation plans are proposed?</p> <p><i>Noise:</i></p> <p>→ What are the noise implications of the proposal?</p> <ul style="list-style-type: none"> <li>■ How will the proposal alter current and predicted patterns of noise in the surrounding area?</li> <li>■ What changes to noise profiles would be seen at other airports as a result of the proposal?</li> <li>■ What measures are envisaged to limit or reduce the number of people affected by noise?</li> </ul> <p><i>Designated sites:</i></p> <p>→ Does the proposal affect any designated nature conservation sites (for example Sites of Scientific Interest or Natura 2000 sites) and if so how might any effects be managed?</p> <p><i>Climate change:</i></p> <p>→ How might the proposal compare, in terms of its impact on carbon emissions, with alternative schemes for providing a similar amount of additional capacity? What are the proposals plans for continuous improvement and reduction of carbon emissions over time?</p> <p><i>Other:</i></p> <p>→ Are there other significant local environmental impacts which should be taken into account?</p>
People	<p>→ How will the proposal impact upon the passenger experience (e.g. choice, cost, accessibility, etc.)?</p> <p>→ What are the likely local social impacts of the proposal, including impacts around the proposed location for new capacity and around any other airports which would be affected, for example on:</p> <ul style="list-style-type: none"> <li>■ Employment</li> <li>■ housing and local communities</li> <li>■ vulnerable groups</li> <li>■ quality of life</li> <li>■ health</li> </ul> <p>→ Are there other significant wider social impacts of the proposal which should be taken into account?</p> <p>→ How does the proposer plan to engage with local communities in taking forward their plans?</p>
Cost	<p>→ What is the estimated cost of the proposal, including surface access, land purchase, compensation and any other associated infrastructure? What are the associated cost assumptions and risks?</p> <p>→ Is it likely that the cost can be met entirely by the private sector?</p> <ul style="list-style-type: none"> <li>■ If not, what is the likely split between public and private sector funding and how has this been calculated?</li> <li>■ How would the proposal be financed?</li> <li>■ What are the associated assumptions and risks?</li> </ul>

Table 5.2: Long Term Schemes Criteria

Long-Term Schemes Criteria	
Operational Viability	<ul style="list-style-type: none"> <li>→ Is the proposal consistent with relevant safety requirements? What operational, safety and/or resilience risks are associated with the proposal? What measures are proposed to mitigate these?</li> <li>→ Is the proposal deliverable within relevant airspace constraints? What assumptions underpin this assessment?</li> </ul>
Delivery	→ What are the main delivery risks in the proposal?

## INITIAL SIFT

5.3.5 The Initial Sift took place at Stage 3 of the sifting process (See Paragraph 5.3.3), and involved applying three criteria for assessing the suitability, identifying proposals:

- a) Which have fundamental issues which could not conceivably be addressed;
- b) Which are similar in scope to other better developed and more detailed proposals; and
- c) Which did not fit with the AC's remit or offer a solution to the key question of providing additional long-term capacity and connectivity for the UK

Of the 52 proposals received, 10 of the proposals involved surface transport improvements or other policy alternatives which would deliver improved use of the UK's current airport infrastructure. These encompassed a broad range of schemes, including radial railways around London and "hub-and-spoke" models based from a single central London terminal. The AC combined elements of these proposals to create three templates testing key themes, which would assess the overall potential to use surface access improvements to address aviation capacity constraints. These proposals are described in greater detail in the Interim Report (Appendix 2, Table 4.1<sup>49</sup>). These schemes represent the 'do minimum'<sup>50</sup> alternative.

5.3.6 A total of 24 of the schemes for airport expansion were sifted out during the Initial Sift because they were not considered to meet the above criteria. 3 of these schemes were for structural changes affecting airport configuration, and were also sifted out. Individual reasons for sift out are provided in the AC Interim Report, Appendix 2: Assessment of Long-term Options<sup>51</sup> (also see Appendix B of this Report). Most of the schemes sifted out at this stage were for feasibility or cost reasons, however the sift discounted schemes for environmental issues, including the following:

- London East - new two runway airport: sifted out for reasons including effects on the Kent Downs Area of Outstanding Natural Beauty (AONB);
- Walland Marsh – four runway airport: sifted out for reasons including its effects on sensitive or protected habitats.

## SECOND SIFT

5.3.7 The 'Second Sift' (referred to in para. 5.3.3), involved considering the remaining schemes against the following criteria:

- Strategic fit
- Economic impacts
- Surface access requirements and impacts

<sup>49</sup> Airports Commission, 2013. *Interim Report*. [\[online\]](#) Accessed 05/01/2016.

<sup>50</sup> represents the conditions which would exist if a scheme did not go ahead.

<sup>51</sup> Airports Commission, 2013. *Interim Report*, Appendix 2, Tables a, b and c. [\[online\]](#) Accessed 08/10/2015.

- Impacts on the environment and people
- Cost
- Operational viability; and
- Deliverability

5.3.8 The proposed schemes which were assessed during the Second Sift were grouped into the following categories in the Interim Report<sup>52</sup>:

- Alternatives to new runways, involving improvements to road and rail transport systems around London, and providing better links between existing airports. In addition, this included policy schemes to maximise capacity at existing airports, such as reducing night flying restrictions (5 schemes);
- Dispersed capacity proposals, involving improvements to regional airports, outside London (5 schemes);
- Heathrow expansion proposals, involving various configurations of new runway at Heathrow (5 schemes);
- New hub airport, involving proposals for entirely new runways at various locations in relatively close proximity to London, including the Isle of Grain 'Boris Island' proposal (9 schemes); and
- Hubs at existing airports proposals, involving improvements to runway capacity at airports other than Heathrow, including Gatwick, Luton and Stansted (5 schemes).

5.3.9 Of the schemes considered within the Second Sift, 19 were sifted out. Individual reasons for sift out are provided in the Interim Report<sup>53</sup>. In addition, some elements of similar schemes were combined to incorporate the best aspects of the inner Estuary proposals. In addition, the Commission decided to combine elements of the various Heathrow proposals to offer a scheme with four runways at Heathrow.<sup>54</sup> This left 8 schemes to go forward to the final sift for additional analysis, plus the additional limited assessment of Birmingham (see Appendix B):

- Heathrow Airport: One new runway northwest scheme;
- Heathrow Airport: One new runway southwest scheme;
- Heathrow Airport: Westerly extension of northern runway;
- Gatwick Airport one new runway;
- Isle of Grain new hub airport;
- Heathrow Airport two new runways;
- Stansted Airport – one new runway;
- Stansted Airport Hub.

<sup>52</sup> Airports Commission, 2013. *Interim Report*, Appendix 2: Assessment of Long-term Options, Section 5.1 p.19. [\[online\]](#) Accessed 05/01/2016.

<sup>53</sup> Airports Commission, 2013. *Interim Report*, Appendix 2: Assessment of Long-term Options, Section 5.1 p.137. [\[online\]](#) Accessed 05/01/2016.

<sup>54</sup> Airports Commission, 2013. *Appendix 2: Assessment of Long-term Options*. [\[online\]](#) Accessed 21/03/2016.

## FINAL SIFT

- 5.3.10 The final stage involved further assessment of the remaining schemes against a number of the sift criteria (see Appendix B). This sift was supported by more detailed, refined assessment in areas, such as impact on airport capacity, surface access and financial viability. In addition, the assessment was supported by an analysis of environmental, social and economic effects, which included:
- Further refinement of noise modelling with additional metrics and better estimations of population;
  - Analysis of local and regional Gross Value Added (GVA) as a proxy for economic opportunity as well a consideration of the Index of Multiple Deprivation for an indication of deprivation around the various proposed sites; and
  - Detailed assessment of the economic, financial, and social impacts of closing Heathrow. (Interim Report, Appendix 2, Section 6.1).
- 5.3.11 Four further schemes were sifted out at this stage, including two schemes for expansion at Stansted, and two at Heathrow. These schemes were scoped out for various reasons, including environmental, social and economic effects which would arise from development, including:
- Loss or impact on cultural heritage assets
  - Flood plain loss, and cost of managing drainage and flood storage capacity
  - Housing loss
  - Economic effects of airport closure
  - Effects on employment
  - Effects on protected habitat; and
  - Loss of agricultural land.
- 5.3.12 The Isle of Grain scheme was identified as having significant environmental and financial viability barriers, and therefore could not be included within the Short List. Despite this challenge, the AC identified that this scheme should be subject to further assessment, both due to the complex nature of determining the advantages and disadvantages, but also because it was considered that the potential realisation of significant benefits would make further consideration worthwhile.

## 5.4 PHASE 2 – SHORT LIST OF SCHEMES

### SHORT LIST

- 5.4.1 The Interim Report reported on the end of Phase 1, and identified two existing airports as credible locations for an additional runway: Gatwick and Heathrow. At Gatwick, the AC committed to further consideration of a new runway to the south of the existing runway. At Heathrow, two alternative expansion proposals were carried forward: a new runway to the northwest of the existing runways; and the extension of the current northern runway to create a runway of double length.
- 5.4.2 The AC announced its recommendations for expanding aviation capacity and its assessment of the shortlisted schemes in the *Final Report* (2015).<sup>55</sup> Although the AC considered that all three schemes were credible schemes, the commission concluded that the proposal for a Northwest Runway at Heathrow Airport (LHR – NWR), in combination with “a significant package of

<sup>55</sup> Airports Commission, 2015. *Final report*. [online] Accessed 01/08/2015.

measures to address its environmental and community impacts” (Final Report, Page 30)<sup>56</sup>, was the preferred scheme.

5.4.3 This AoS involves a consideration and assessment of the short list of schemes, as described in Appendix A and summarised in Section 6 below.

## THAMES ESTUARY – ISLE OF GRAIN

5.4.4 In addition to short-listing three schemes, further feasibility studies were undertaken on a new airport in the inner Thames Estuary. The AC published the findings of this assessment in September 2014.<sup>57</sup> The feasibility studies which supported the AC’s decision considered the operational feasibility and surface access requirements of this Scheme.<sup>58</sup> In addition to these concerns the environmental and socio-economics advantages and disadvantages of the scheme were considered in the Summary and Decision Paper<sup>59</sup>, and are described below:

→ Advantages:

- Regenerative benefits for deprived areas of Essex and Kent
- Enabling the expansion of London eastwards (Summary and Decision Paper, Section 3.13<sup>60</sup>); and
- A substantial reduction in the number of people affected by noise, when compared to Heathrow.

→ Disadvantages:

- Economy to the west of London would suffer from the loss of Heathrow
- Habitat loss and impact on wildlife, including impacts on The Thames Estuary and Marshes Special Protection Area (SPA) and Ramsar site
- Loss, and impact on the setting of cultural heritage and landscape assets; and
- Loss of existing housing and challenges with delivering replacement communities.

5.4.5 In setting out recommendations regarding the Short List of Options, the AC’s *Final Report* (Executive Summary)<sup>61</sup> confirmed that the Thames Estuary scheme would be “*unfeasibly expensive, highly problematic in environmental terms and would be hugely disruptive for many businesses and communities*”. The AC therefore concluded that it did not represent a credible scheme for shortlisting.

<sup>56</sup> Airports Commission, 2015. *Final report*. [\[online\]](#) Accessed 01/08/2015.

<sup>57</sup> Airports Commission, 2014. *Inner Thames Estuary Airport: Summary and Decision Paper*. [\[online\]](#) Accessed 01/08/2015.

<sup>58</sup> Airports Commission, 2014. *Inner Thames estuary airport studies*. [\[online\]](#) Accessed 01/08/2015.

<sup>59</sup> Airports Commission, 2014. *Inner Thames Estuary Airport: Summary and Decision Paper*, pp.12-37. [\[online\]](#) Accessed 05/01/2016.

<sup>60</sup> Airports Commission, 2014. *Inner Thames Estuary Airport: Summary and Decision Paper*, Section 3, p.16 . [\[online\]](#) Accessed 05/01/2016.

<sup>61</sup> Airports Commission, 2015. *Final report*, p. 4. [\[online\]](#) Accessed 01/08/2015.

## 5.5 ALTERNATIVE SCHEMES TO BE ASSESSED

5.5.1 In December 2015 the government accepted the AC's case for airport expansion in the South-East and the shortlist of schemes for expansion<sup>62</sup>.

### TEMPORAL SCOPE

5.5.2 The AC's Interim Report<sup>63</sup> concludes that capacity equivalent to one net additional runway would be needed in South East England by 2030. The short listed schemes were designed to meet the timing of this capacity requirement. The temporal scope of the assessment is based on the following key dates:

- 2014/2015 – Current baseline unless otherwise referenced.
- 2020- 2025 – Infrastructure construction.
- 2025/2026 – Opening year.
- 2030/ 2040/ 2050 – Assessment years used for some topics for future operation.

5.5.3 Decommissioning has not been considered by this AoS as there is no set period for Airport decommissioning, and therefore the likelihood of airport decommissioning is unknown.

### SPATIAL SCOPE

5.5.4 The three schemes which are considered within this AoS are those assessed by the Airport Commission. The shortlisted scheme promoters continued to refine their schemes following the formal submission of scheme designs in May 2014 to the AC. Further variations to the scheme designs were captured by government and the scheme promoters in the form of a Statement of Principles (SoP) for each scheme<sup>64</sup>. These SoP present variations to the proposals that were assessed by the AC and therefore to the scheme design originally assessed within AoS. These SoPs set out the proposed schemes which have been considered prior to the publication of the Airports NPS.

5.5.5 The SoPs have been subject to a high-level screening (Appendix D of this AoS Report). This screening has been undertaken to determine whether promoters put forward variations that are likely to result in differences to the original AC schemes which could give rise to significant differences in environmental or sustainability effects which have not already been assessed as part of the AoS. The principal changes to scheme design comprise:

- LGW- 2R: Change in phasing of construction; the first phase of the new terminal would open at the same time as the new runway in 2025.
- LHR-ENR: The M4 would not require widening to cope with the increased demand resulting from expansion; surface access proposals comprising M25 works and tunnelling (J14 to the south and J15 to the north) (on a like for like replacement basis); local road diversions and improvements including for the A4 and A3044.
- LHR-NWR: The M4 would not require widening to cope with the increased demand resulting from expansion;

<sup>62</sup> Department for Transport, 2015. *Government confirms support for airport expansion in the south-east*. [\[online\]](#) Accessed 06/01/2017.

<sup>63</sup> Airports Commission, 2013. *Interim Report*, p. 172. [\[online\]](#) Accessed 01/08/2015.

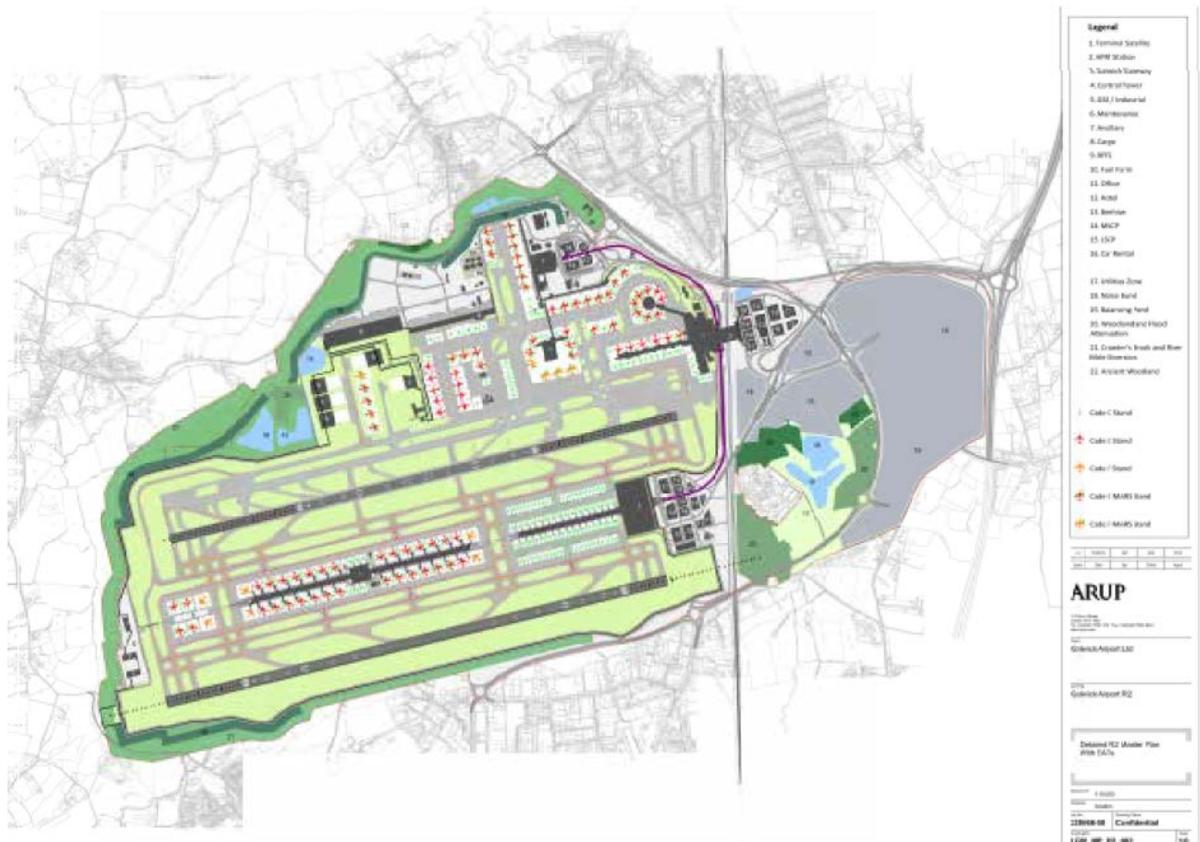
<sup>64</sup> The Secretary of State for Transport and Gatwick Airport Limited, 2016. *Statement of Principles*. ;The Secretary of State for Transport and Heathrow Hub Limited and Runway Innovations Limited, 2016. *Statement of Principles*; The Secretary of State for Transport and Heathrow Airport Limited, 2016. *Statement of Principles* [\[online\]](#) Accessed 06/01/2017.

- 5.5.6 The high-level screening determined that most variations are minor in relation to the AoS as they relate to proposals to change phasing and reduce scheme costs and refine commitments to mitigation proposed by the AC, which have already been captured in the process.
- 5.5.7 The screening exercise identified that alternative surface access arrangements proposed for LHR-ENR to reduce impact on air quality may also change the magnitude of identified sustainability effects for other topics considered within the AoS. This is explained in Appendix D.
- 5.5.8 As the design of a preferred scheme progresses subsequent to the Airports NPS, further variation of the scheme design are anticipated. These may seek to avoid, reduce or offset negative impacts and enhance positive impacts and would be assessed through the EIA process.

### GATWICK SECOND RUNWAY SCHEME (LGW-2R) FOOTPRINT

- 5.5.9 The *Final Report*<sup>65</sup> describes the scheme as new full length runway to the south of and running parallel to the existing runway. The Figure below shows the Masterplan which has been produced by the promoter of this scheme.<sup>66</sup>

Figure 5.1: Gatwick Second Runway Scheme Illustrative Masterplan



- 5.5.10 The space between the runways would be set at 1,045m, which would provide room for the required supporting airport infrastructure – a new terminal building, main pier and satellite. It would also be needed to permit simultaneous independent, mixed mode operations on each

<sup>65</sup> Airports Commission, 2015. *Final report*, p. 97. [\[online\]](#) Accessed 05/01/2016.

<sup>66</sup> Airports Commission, 2015. *Final report*, p. 97. [\[online\]](#) Accessed 05/01/2016.

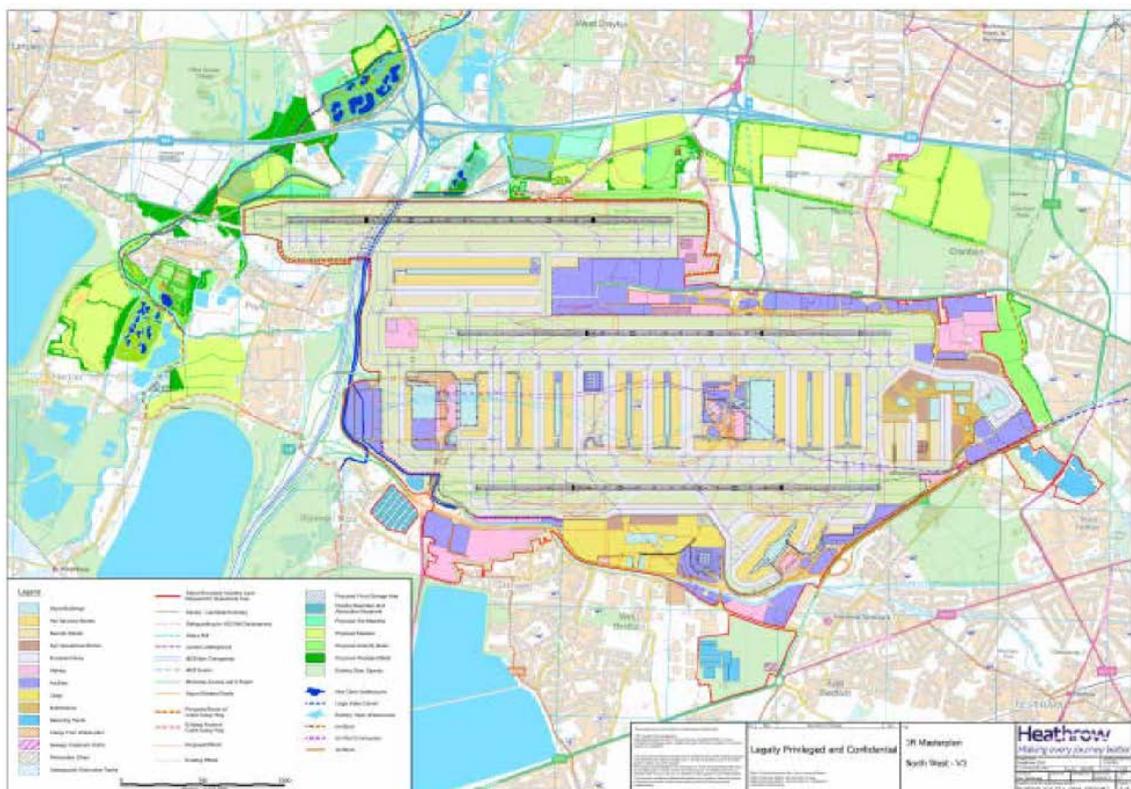
runway, as proposed by the scheme promoter, which would enable the proposed operating capacity of 560,000 ATM per annum.

- 5.5.11 The capacity of the new terminal building would be approximately 50 million passengers per annum (mppa), slightly higher than the combined capacity of the two existing terminal buildings (which is around 45 mppa).
- 5.5.12 The airport's footprint would extend to the south to encompass the space for the new runway; and to the east, broadly to the M23, to provide space for ancillary airport services and parking. In total, 624ha is estimated to be required for airport development, subject to more detailed design work, and up to an additional 78ha for surface access improvements. These land take requirements could change following detailed construction and surface access route design, and any potential mitigation. No additional land take for flood storage schemes is identified in the proposal.

### HEATHROW NORTHWEST RUNWAY SCHEME (LHR – NWR) FOOTPRINT

- 5.5.13 The scheme involves a new full length runway (3,500m) to the northwest of the current northern runway at Heathrow, as set out in the Masterplan below. This arrangement provides a full-length runway and is sited further to the west than existing runways.<sup>67</sup>

Figure 5.2: Heathrow Northwest Runway Scheme Illustrative Masterplan



- 5.5.14 The horizontal separation between the new runway and the current northern runway is 1,045 m, allowing it to operate independently of the existing runways. When the promoter's proposed alternation pattern is factored in this would allow a forecast operating capacity of 740,000 ATM per year and would offer a level of continuing respite for local communities while enhancing the airport's resilience.

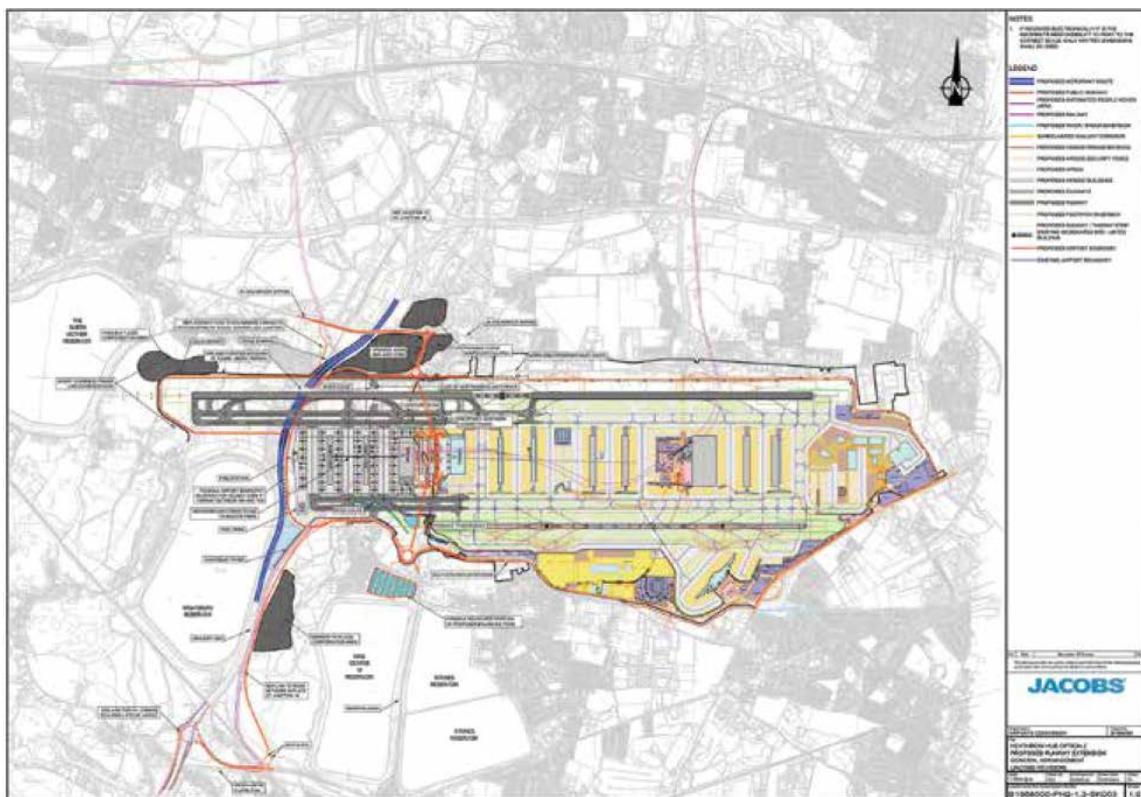
<sup>67</sup> Airports Commission, 2015. *Final report*, p. 97. [\[online\]](#) Accessed 05/01/2016.

- 5.5.15 A new terminal building would be built to the west of the current central terminal area, with the majority of the airport's terminal space and satellites and the transport spine of the airport continuing to run between the two existing runways in what is often referred to as a 'toast rack' configuration. This new terminal would be built with similar dimensions to Terminal 5, and will be constructed in stages. When complete it will have a capacity of 35 mppa, similar to that of Terminal 5 (currently 30 mppa).
- 5.5.16 In total, 569 ha of land would be directly required for the airport development, with up to an additional 43 ha for flood storage and 294 ha for related surface access improvements. Approximately 431 ha of this is within designated Green Belt. These land take requirements however, could change following detailed construction and surface access route design, and any potential mitigation.

### HEATHROW EXTENDED NORTHERN RUNWAY SCHEME (LHR – ENR) FOOTPRINT

- 5.5.17 The scheme involves an extension of the existing northern runway to the west. This would effectively create two separate runways, each 3,000 m in length with a 650 m safety area in between, enabling them to be operated independently.<sup>68</sup> The Figure below shows the Masterplan which has been produced by the promoter of this scheme.

Figure 5.3: Heathrow Extended Northern Runway Scheme Illustrative Master Plan



- 5.5.18 The extension to the northern runway would allow it to be used for departures and arrivals at the same time, essentially providing the same capacity as two independent runways; or at less busy times of day to facilitate 'deep' or 'shallow' landings on the westerly and easterly sections of the runway, reducing noise impacts for local communities by enabling aircraft to remain at a higher altitude as they approach the airport boundary. The scheme would provide an operating capacity

<sup>68</sup> Airports Commission, 2015. *Final report*, p. 97. [\[online\]](#) Accessed 05/01/2016.

of 700,000 ATM per year; and a degree of noise respite for local communities, although it would not be possible to maintain runway alternation throughout the operating day.

- 5.5.19 As for the Northwest Runway scheme, the runway extension is supported by a new terminal building to the west of the existing central terminal area, with capacity to accommodate 35 mppa. There will also be space for hotels and parking and for development of ancillary services to the south of the airport (on the north side of the perimeter road) although the scale of land for commercial development would be smaller than under the alternative Heathrow proposal. The airport's footprint would expand to the north, south and west with a total direct land take of 336 ha. Additional land take for surface access improvements and flood storage of up to 330 ha and 57 ha respectively may also be required. Approximately 278 ha of the proposed land take would lie within Green Belt. As for the other schemes, these land take requirements could change following detailed construction and surface access route design, and any potential mitigation AC's *Final Report*.

### SURFACE ACCESS

- 5.5.20 The impacts of surface access transport improvements have been considered for each of the three short-listed alternatives considered by the AC. The surface access transport improvements assessed by the AC incorporates:
- A core baseline of transport improvements comprising proposals for the related road and rail transport networks which are currently in construction together with fully committed future road and rail investment proposals;
  - An extended baseline of transport improvements containing an indicative package of additional investment for the relevant road and rail networks considered necessary to accommodate background demand in the absence of any airport expansion; and
  - Road and rail improvements which have been proposed as necessary specifically to support expansion.
- 5.5.21 However, the final package of road and rail surface access improvements has not yet been determined. The Airports NPS acknowledges that surface access improvements are required to support expansion. Nonetheless, the AoS acknowledges that significant effects are likely to arise as a result of proposed surface access transport improvements both for the purposes of addressing background transport demand but also for supporting airport expansion, and the assessment undertaken by the AC has considered this. The AoS therefore includes the assessment the surface access transport improvements proposed by the AC to support airport expansion and tests variations to surface access in Appendix D.

### LGW-2R

- 5.5.22 The surface access design for Gatwick is based on a combination of existing infrastructure, schemes which already have firm funding commitments and schemes which are likely to be required by 2030 in order to meet background demand growth.
- 5.5.23 Additional works which have been assessed specifically to support expansion comprising of junction enhancements on the strategic road network as well as the rerouting of roads around the edge of the expanded airfield site (Table 5.3). There are no additional rail schemes.

Table 5.3: LGW-2R Related Surface Access Enhancements<sup>69</sup>

Category	Location	Requirement
Strategic Road	M23 J9	Slip road widening
		Grade-separated flyover for southbound slip
	M23 J9 to J9a road widening	Widening of existing section to four and five lanes as appropriate
	Airport Way	Widening of existing section of four lanes in each direction
	A23 re-alignment	Provision of new section of A23
Grade-separated section of A23 re-alignment		
Local road network	Long-term parking	New high capacity roundabout and approaches
	Industrial zone	New roundabout and approaches
	North Terminal access	New high capacity roundabout and approaches
		A23 to Airport Way grade-separated flyover
	New Terminal access	Provision of new section connecting M23 to new terminal
		Grade-separated section of new access to new terminal
	South Terminal access	New high capacity roundabout and approaches
	Longbridge Roundabout	Capacity enhancements
	Gatwick Road	New roundabout and approaches
Balcombe Road	Re-provision of existing road (standard 7.5m width one lane in either direction)	

#### LHR-NWR

- 5.5.24 The surface access strategy for the Northwest Runway scheme is based on a combination of existing infrastructure, schemes which already have firm funding commitments, schemes which are likely to be required by 2030 in order to meet background demand and those which are required to support expansion, either through accommodating the expanded airport site or providing new links and capacity to improve public transport mode share.
- 5.5.25 A number of road schemes were also included in the surface access strategy for the Heathrow Airport Northwest Runway schemes, including tunnelling a section of the M25 to the west of the airport. These are set out in Table 5.4 below.

<sup>69</sup> Airports Commission, 2015. *Final report*, p. 154. [\[online\]](#) Accessed 05/01/2016.

Table 5.4: LHR-NWR Related Surface Access Enhancements<sup>70</sup>

Category	Location	REQUIREMENT
Strategic Road	M4 J3 to J4	Road widening
	M4 Airport Spur	Road widening
	M4 J2 to J3	Road widening
	M4 J4 and J4B	Road widening
	M4	Large M4 Junction 4b replacement
	M4	Higher capacity at M4 J4a
	M4	Capacity improvements to existing main airport tunnel
	M25	M25 tunnelling costs (south of junction 15)
Local Road Network	A4	Diversion of A4 road alignment, dual carriageway
	A3044	Diversion of A3044 road alignment, dual carriageway
	Airport Roads	Airport Way/Southern Perimeter Road Interchange, grade-separated junction and flyover/bridge structures
	Heathrow Road Tunnel	Southern Road Tunnel/Southern Perimeter Road Interchange
	Airport One Way	One way system for western campus
Rail	Southern Rail Access to Staines	

## LHR-ENR

- 5.5.26 In relation to surface transport, the AC has carried out its assessment of the Extended Northern Runway on the basis of the same surface access strategy as for the Northwest Runway. For the rail network, an identical package of measures is proposed to that for Northwest Runway. The road interventions vary slightly between the two schemes as the footprint of LHR-ENR requires a different strategy for improvements to the local road network, as although similar roads are affected, they are in a different location.
- 5.5.27 The Heathrow ENR Surface Access arrangements which were considered by the AC have undergone further consideration by the promoter to improve air quality. Variations put forward to DfT include 'Iteration 3' and 'Iteration 4' which are considered by the promoter to be deliverable, and could provide reductions in adverse air quality effects relative to the surface access proposals assessed by the AC. Table 5.5 describes the ENR surface access arrangements considered by the AC assessment, and also Iteration 3 and 4.

<sup>70</sup> Airports Commission, 2015. *Final report*, p. 158. [\[online\]](#) Accessed 05/01/2016.

Table 5.5: LHR-ENR Related Surface Access Enhancements<sup>71</sup>

Category	Location	Description of Surface Access Arrangements		
		AC's Extended Northern Runway	Variation Iteration 3	Variation Iteration 4
Strategic Road	M4 J3 to J4	Road widening		
	M4 Airport Spur	Road widening		
	M4 J2 to J3	Road widening		
	M4 J4 and J4B	Road widening		
	M4	Large M4 J 4b replacement		
	M4	Higher capacity at M4 J4a		
	M4	Capacity improvements to existing main airport tunnel		
	M25	M25 tunnelling (south of junction 15)		
	M25	N/A	M25 Junction 14 connection to Terminal 5/6 Access	
Local Road Network	A4 Diversion to M4 Spur	N/A	Diversion of the A4 north west of Harmondsworth Diversion of the A4 east Sipson Existing A4 downgraded to single carriageway west of M4 Spur and stopped up at BA Waterside	N/A
	Traffic Management on Existing A4	N/A	N/A	Traffic management along line of existing A4, between A3044 and M4 Spur junction at Terminal 2
	A4 to Southern Perimeter Road connection via A3044 Diversion	A3044 diverted through tunnel running parallel to M25 – expected to have light traffic	A4/ A3044 access to Southern Perimeter Road reconfigured to accommodate M25 J14 link	
	New roundabouts on access roads	Southern Road Tunnel/ Southern Perimeter Road Interchange junction at Terminal 5/6	Southern Perimeter Road Interchange junction configuration altered to accommodate M25 J14 link Southern Road Tunnel under southern runway unaffected.	
	Airport Roads	A3044 diverted to link Terminal 5/6 with M25 J13	New M25 J14 connection to Terminal 5/6	
	M25 J13 D2	Grade-separated junction and flyover/bridge structures	New M25 J14 connection to Terminal 5/6	
	Heathrow Road Tunnel	Providing new spur access		

<sup>71</sup> Airports Commission, 2015. *Final report*, p. 159. [\[online\]](#) Accessed 05/01/2016.

**Table 5.5: LHR-ENR Related Surface Access Enhancements<sup>71</sup>**

Category	Location	Description of Surface Access Arrangements		
		AC's Extended Northern Runway	Variation Iteration 3	Variation Iteration 4
	Airport One Way	One way system for western campus		
Rail	Southern Rail Access to Staines			

5.5.28 The key differences between the surface access arrangements are as follows:

- AC's Extended Northern Runway Surface Access:
  - Terminal 5/6 connected to M25 J13 via diversion of the A3044;
  - No change to the A4 west of Stanwell Moor Road.
- Iteration 3 Surface Access:
  - M25 J14 connection M25 and Terminal 5/6 south west of the airport;
  - A4 diverted north and west of Harmondsworth and north and east of Sipson. The diversion will be partly online, and partly offline;
  - Existing A4 downgraded to single carriageway west of M4 Spur and stopped up at BA Waterside.
- Iteration 4 Surface Access:
  - M25 J14 connection M25 and Terminal 5/6 south west of the airport;
  - Traffic management on the A4 west of Stanwell Road connecting to M4 Spur.

#### RELATIONSHIP WITH OTHER PROPOSALS

5.5.29 A number of surface access proposals form the existing and extended baseline (described in 5.5.13) and would therefore come under separate assessment processes. These include:

- Major rail schemes such as Crossrail and HS2.
- Proposed road projects which would increase capacity on the key motorway links serving the airport.

5.5.30 The assessment of cumulative effects includes these rail schemes in addition to both road and rail projects covered by road and rail investment strategies, and the National Networks NPS. Some of these schemes have also been subject to separate legislative processes such as Hybrid Bill. All schemes classed as NSIPs will be subject to consenting under the Planning Act 2008.

5.5.31 The schemes in Tables 5.3 – 5.5 have either been assessed by the AC, or are assessed as part of the AoS. Variations to the schemes which are assessed are described in Appendix D. Transport schemes which are not included in these tables are assessed for cumulative effects (also see Table 6.5).

## OPERATIONAL AIRSPACE

- 5.5.32 To inform the assessments, indicative flightpath designs for each scheme were developed by the CAA, drawing on inputs from NATS, the scheme promoters and the AC Secretariat. Creating and agreeing airspace plans requires a process of detailed design and public consultation and the careful consideration of options for mitigating any negative impacts.
- 5.5.33 The indicative flightpath designs are not a fixed design for where future flightpaths may in practice be located, but are referred to as the means for assessing the potential noise impacts at this stage of scheme (AC's *Final Report*, Section 9.13). For the LHR-NWR scheme, three flightpath designs were proposed for assessment. One flightpath design was assessed for Gatwick and Heathrow northern runway extension. These indicative designs were amended to respond to Promoters feedback, particularly regarding the northern runway extension at Heathrow.

## 5.6 FORECAST SCENARIOS

- 5.6.1 The AC used five scenarios to predict how the aviation sector and the broader global economy might develop:
- Assessment of need - Future demand is primarily determined by central projections published by sources such as the Office for Budget Responsibility, OECD and IMF.
  - Global growth - Higher global growth in demand for air travel in the future, coupled with lower airline operating costs.
  - Relative decline of Europe - Higher relative growth of passenger demand in emerging economies in future and a strengthened position of Far and Middle Eastern aviation hubs and airlines.
  - Low cost is king - Low-cost carriers strengthen their position in the short-haul market and capture a substantial share of the long-haul market, plus higher passenger demand from all world regions and lower operating costs.
  - Global fragmentation - Economies adopt protectionist policies, with a decline in passenger demand from all world regions, coupled with higher operating costs.<sup>72</sup>
- 5.6.2 These five scenarios were incorporated into the Commission's forecasts of future aviation demand and used to test the robustness of the Commission's analysis in relation to a range of forecasts. In the AC's evidence base all five scenarios were used where appropriate as sensitivities, but the core narrative and analysis was focused more firmly on the 'assessment of need scenario', which is based on central projections of key economic indicators. This was in line with advice from the International Transport Forum, which stated that this 'should be regarded as the most likely forecast' noting, in particular, the use of central projections of economic and population growth, oil prices and other drivers of future aviation demand.
- 5.6.3 The AC also prepared two sets of forecasts for each scenario based on different approaches to handling carbon emissions from aviation; 'carbon-capped' and 'carbon-traded'. The carbon-capped scenario assumes a firm aviation emissions cap of 37.5 MtCO<sub>2</sub> is in place in 2050, as per the planning assumption made by the Climate Change Committee (CCC) to meet requirements of the Climate Change Act 2008<sup>73</sup>. The carbon-traded scenario assumes that emissions reductions can be enabled where they are most desirable or efficient across the global economy, for example through an international trading mechanism.

<sup>72</sup> Airports Commission, 2015, *Business Case and Sustainability Assessment Heathrow Airport Northwest Runway* [\[online\]](#) Accessed 06/01/2017.

<sup>73</sup> Committee on Climate Change, 2013. *Factsheet: Aviation*. [\[online\]](#) Accessed 04/01/2016.

- 5.6.4 DfT has produced low, central and high demand scenarios in its updated DfT demand forecasts<sup>74</sup>. The central scenario broadly corresponds to the AC's central scenario, assessment of need. The AC scenario used central projections for inputs published by agencies such as the Office for Budget Responsibility, OECD and IMF and assumes that there are no changes in airline business models. These assumptions are broadly consistent with the central scenario used in the department's previous aviation forecasts and in the latest update<sup>75</sup>.
- 5.6.5 DfT low and high scenarios vary with key drivers, such as oil prices and GDP. The low and high assumptions are based on broadly similar assumptions underpinning the AC's Global Growth and Global fragmentation scenarios.
- 5.6.6 DfT has modified the carbon capped scenario used in the AC's analysis by using a combination of carbon pricing and specific abatement measures as opposed to relying on pricing alone. This takes account of updated research on the costs of abatement measures<sup>76</sup>. Under this approach, if expansion leads to CO<sub>2</sub> emissions above the 37.5 MtCO<sub>2</sub> planning assumption, then further abatement effort is required to meet the assumption and its cost included in the appraisal. Further details of the abatement required under the different expansion scenarios, the measures used and their associated costs are provided in the Carbon Appendix (A9)
- 5.6.7 Importantly, to simplify the analysis, DfT assumes that the same carbon price is used for both carbon scenarios. This means that future aviation demand is expected to be the same under both scenarios, as the same carbon price would have the same impact on suppressing demand (with further specific measures making up the additional abatement required under the carbon capped scenario). This means that the associated passenger forecasts and associated benefits are the same under both carbon traded and carbon capped scenarios.
- 5.6.8 This AoS uses the DfT central demand scenario. The sensitivity analysis discussed below however, provides further assurance that the highest magnitude of impacts are considered for all topics in order to show that mitigation measures are satisfactory and legal requirements on air quality and carbon can be met.
- 5.6.9 In order to test how conclusions about impacts could vary between the different scenarios, this AoS also, where relevant, presents a sensitivity test for specific impacts to illustrate the greatest impact. Higher levels of aviation noise and emissions of air pollutants and carbon are generally associated with the scenario that has the highest rate of growth in passenger demand and ATMs. So the higher demand scenario is typically used to illustrate these higher impacts.
- 5.6.10 The results of these scenario tests are reported in detail in this AoS in the topic annexes for these impacts, and a brief summary is provided in this report.
- 5.6.11 Other impacts reported in this AoS, such as biodiversity and historic environment, are largely related to land-take, not growth in passenger demand and ATMs, and so do not directly vary between the scenarios.
- 5.6.12 For the economy topic, this AoS presents the range of estimates of economic benefits across the different demand scenarios.
- 5.6.13 The approach taken in this AoS of using DfT's central scenario as the main scenario, and presenting a sensitivity test using DfT's high demand growth scenario, provides additional assurance that the conclusions in the AoS will be robust to possible new forecasts of aviation passenger demand that could be released subsequent to publication of this AoS.

<sup>74</sup> Department for Transport, 2017. *UK Aviation Forecasts 2017*

<sup>75</sup> Department for Transport, 2013. *UK Aviation Forecasts 2013*

<sup>76</sup> Ricardo Energy and Environment, 2017, *UK Informative Inventory Report (1990 to 2015)*. [[online](#)] Accessed 19/09/2017.

# 6

## APPRAISAL OF ALTERNATIVES

### 6.1 INTRODUCTION

- 6.1.1 Topic based assessments have been undertaken for each alternative scheme, building on previous SA's undertaken by the AC. The twelve topics include: community; quality of life; economy; noise; biodiversity; soil; water; air quality; carbon; historic environment and resources and waste.
- 6.1.2 It should be noted that for comparison of alternatives, the schemes that have been assessed in the AoS are those submitted to the AC and the Government. Subsequent variations in scheme design and operation have potential to further reduce the impacts identified, and the Government expects the airport operator to continue to refine their design in this respect prior to seeking development consent.
- 6.1.3 Appendix A presents the topic based assessments and provides the detail for the assessment of each scheme. The outcomes are summarised in this section. It should be noted that submissions to the AC did vary in relation to the level of detail provided by promoters. In order to ensure that the assessments were equal across all three schemes, assumptions were sometimes made to ensure a consistent approach and these are recorded where relevant in Appendix A.

### 6.2 SUMMARY OF APPRAISAL

A summary of the significant effects which have been identified for each scheme using the AoS Framework is presented in Table 6.1 below. A comparative discussion for each Objective under each topic follows the table.

Table 6.1: Summary of Appraisal of Alternatives

Topic	Objective	Appraisal Question	Gatwick Second Runway	Heathrow Extended Northern Runway	Heathrow Northwest Runway
Community	1. To avoid or minimise negative effects on community viability, including housing, facilities and indirect effects.	1. Will it lead to a loss of housing and community facilities?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		2. Will it lead to increasing demand for housing and community facilities?	Negative effect (-)	Negative effect (-)	Negative effect (-)
		3. Will there be indirect effects on community viability?	Negative effect (-)	Significant Negative effect (--)	Significant Negative effect (--)
	2. To avoid or minimise disproportionate impacts on any social group.	4. Will it minimise disproportionate negative effects on particular regions, users or vulnerable social groups?	Negative effect (-)	Negative effect (-)	Negative effect (-)
Quality of Life	3. To maintain and where possible improve the quality of life for local residents and the wider population.	5. Will it help to maintain and improve quality of life?	Mixed significant positive and significant negative (++/--)	Mixed significant positive and significant negative (++/--)	Mixed significant positive and significant negative (++/--)
Economy	4. To maximise economic benefits and to support the competitiveness of the UK economy.	6. Will it enhance economic benefits?	Significant Positive effect (++)	Significant Positive effect (++)	Significant Positive effect (++)
		7. Will it contribute to sustainable growth in employment?	Significant Positive effect (++)	Significant Positive effect (++)	Significant Positive effect (++)
		8. Will it support the productivity of the UK economy?	Significant Positive effect (++)	Significant Positive effect (++)	Significant Positive effect (++)
	5. To promote employment and economic growth in the local area and surrounding region.	9. Will it incorporate accessibility improvements, particularly with key local employment centres and areas of high unemployment?	Neutral	Neutral	Neutral
		10. Will it contribute to growth in the local economy?	Significant Positive effect (++)	Significant Positive effect (++)	Significant Positive effect (++)

Table 6.1: Summary of Appraisal of Alternatives

Topic	Objective	Appraisal Question	Gatwick Second Runway	Heathrow Extended Northern Runway	Heathrow Northwest Runway
Noise	6. To minimise and where possible reduce noise impacts on human receptors.	11. Will it avoid or reduce the harmful effects due to exposure of people and sensitive buildings to noise?	Predominantly Significant Negative effect (--)	Predominantly Significant Negative effect (--)	Predominantly Significant Negative effect (--)
Biodiversity	7. To protect and enhance designated sites for nature conservation.	12. Will it affect internationally, nationally and locally designated biodiversity sites?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		8. To conserve and enhance undesignated habitats, species, valuable ecological networks and ecosystem functionality.	13. Will it conserve and enhance undesignated habitats, internationally and nationally protected species and valuable ecological networks, such as priority habitats and priority species.	Significant Negative effect (--)	Significant Negative effect (--)
	14. Will it increase the exposure of wildlife to transport noise, air pollution, and water pollution?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)	
Soil	9. To protect sites designated for geodiversity.	15. Will it preserve, protect and improve geodiversity?	Neutral	Neutral	Neutral
	10. To minimise loss of undeveloped soils and of Best and Most Versatile agricultural land, and protect soil against erosion, contamination and degradation.	16. Will it maximise construction on previously developed land, minimise use of greenfield land?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		17. Will it lead to the disturbing, harm, contamination or loss of soil resources?	Negative effect (-)	Negative effect (-)	Negative effect (-)
Water	11. To protect the quality of surface and ground waters, and use water resources sustainably.	18. Will proposals have adverse effects on the achievement of the environmental objectives established under the Water Framework Directive?	Negative effect (-)	Negative effect (-)	Negative effect (-)
		19. Will it result in the modification of watercourses?	Negative effect (-)	Significant Negative effect (--)	Significant Negative effect (--)

Table 6.1: Summary of Appraisal of Alternatives

Topic	Objective	Appraisal Question	Gatwick Second Runway	Heathrow Extended Northern Runway	Heathrow Northwest Runway
		20. Will it result in the loss in productivity of fisheries?	Negative effect (-)	Significant Negative effect (--)	Significant Negative effect (--)
		21. Will it lead to an increase in the consumption of available water resources?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
	12. To minimise flood risk and ensure resilience to climate change.	22. Will it increase flood risk through increased runoff?	Negative effect (-)	Negative effect (-)	Negative effect (-)
		23. Will it increase area of development within areas at risk of flooding?	Negative effect (-)	Significant Negative effect (-)	Neutral effect (0)
		24. Will it be able to adapt to climate change?	Negative effect (-)	Negative effect (-)	Negative effect (-)
Air Quality	13. To improve air quality and reduce emissions consistent with EU, national and local standards and requirements.	25. Will it support compliance with local, national and European air quality requirements or legislation?	Negative effect (-)	Significant Negative effect (--)	Significant Negative effect (--)
		26. Will it reduce the exposure to air quality issues for local communities and sites designated for nature conservation?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
Carbon	14. To minimise carbon emissions in airport construction and operation.	27. Will the approach to the development be consistent with overall carbon requirements?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		28. Will the approach minimise carbon emissions associated with surface transportation?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
Resources and Waste	15. To minimise consumption of natural, particularly virgin non-renewable, resources.	29. Will it be possible to minimise the consumption of natural resources?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)

Table 6.1: Summary of Appraisal of Alternatives

Topic	Objective	Appraisal Question	Gatwick Second Runway	Heathrow Extended Northern Runway	Heathrow Northwest Runway
	16. To minimise the generation of waste in accordance with the principals of the resource efficiency hierarchy.	30. Will it be possible to minimise waste generated during construction and operation?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
Historic Environment	17. Conserve and where appropriate enhance heritage assets and the wider historic environment including buildings, structures, landscapes, townscapes and archaeological remains.	31. Will it affect the significance of internationally and nationally designated heritage assets and their settings?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		32. Will it affect the significance of non-designated heritage assets and their settings?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		33. Will it conserve or enhance heritage assets and the wider historic environment including landscapes, townscapes, buildings, structures, and archaeological remains?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		34. Will it harm the significance of heritage assets for example from the generation of noise, pollutants and visual intrusion?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
Landscape	18. To promote the protection and improvement of landscapes townscapes, waterscapes and the visual resource, including areas of tranquillity and dark skies.	35. Will it protect and enhance nationally and locally designated landscape, townscape and waterscape?	Negative effect (-)	Negative effect (-)	Negative effect (-)
		36. Will it lead to impact on sensitive views ?	Significant Negative effect (--)	Significant Negative effect (--)	Significant Negative effect (--)
		37. Will it lead to a loss of tranquillity and increase in light pollution?	Negative effect (-)	Negative effect (-)	Negative effect (-)

## 6.3 COMMUNITY

### Objective 1: To avoid or minimise negative effects on community viability, including housing, facilities and indirect effects

- 6.3.1 Housing and community facilities** – Each scheme will result in the relocation of housing and industrial/employment land, which may have a negative effect on community viability. LGW-2R is expected to require the relocation of 168 residential properties, LHR-NWR the relocation of 783 residential properties and LHR-ENR the relocation of 242 residential properties. Each of the three schemes will also result in the loss of community facilities, which could also have a negative effect on community viability. In the case of LGW-2R, four children’s nurseries or crèches, two places of worship, Trent House care home, one charity facility, Crawley Rugby Club, Public Rights of Way (PRoW) and part of Rowley Wood are also likely to be lost. In the case of LHR-ENR, the loss of three pubs, public rights of way, cycle paths, recreational space and open spaces is expected, in addition to noise implications for Pippins primary school. In the case of LHR-NWR, Harmondsworth Primary School is expected to be lost, along with Harmondsworth Community Hall, Sipson Community Centre, Heathrow Special Needs Centre in Longford, nursery schools in Longford and Sipson, the White Horse and Kings Arms pubs in Longford, public rights of way, cycle paths, and a number of recreational facilities and spaces such as Sipson Recreation Ground. Although some mitigation is provided in terms of financial compensation and other measures, each of the three schemes is likely to result in a substantial loss of housing and community facilities that cannot be reversed. Furthermore, for both Heathrow schemes, cumulative effects may be experienced by the community as a result of infrastructure projects such as Crossrail. As a result, the overall effects on community viability caused by loss of housing and community facilities as a result of each scheme are considered to be significant negative.
- 6.3.2 Demand for facilities** – For each of the three schemes, an additional runway is expected to generate additional demand for households and community facilities. LGW-2R is likely to generate demand for 136 additional housing units per local authority per year, which are likely to require support from additional spaces in local schools and 2 additional GPs per local authority to 2030. LHR-ENR is likely to generate demand for up to an additional 450 homes per year, which are likely to require support from additional schools, 2 additional health centres (14 GPs) and 2 primary care centres per local authority to 2030. LHR-NWR is likely to generate demand for 300 to 500 additional homes per local authority per year as well as the support from additional schools, 2 additional health centres (14 GPs) and 2 primary care centres per local authority to 2030. Overall, impacts on housing demand will affect local authorities across London and the South East although the demand will spread and is low in comparison to existing planned housing. The scale of the change is unlikely to significantly increase the housing pressures across the entire London region. As a result, the overall effects on community viability caused by increased demand for housing and community facilities as a result of each scheme are considered to be negative.
- 6.3.3 Indirect effects** - For all three schemes, additional effects on community viability are expected to be experienced in terms of additional traffic movements which may lead to more traffic and increased journey times. This may lead to issues of severance, loss of sense of place, breakdown in community cohesion, and a reduction in the quality of amenity within the community. Furthermore, with increased airport capacity, cumulative effects may be experienced in terms of noise and air quality which may affect community viability and house prices. It was estimated by the AC that 51,328 people will experience a rise in annual mean NO<sub>2</sub> levels in the case of LGW-2R, which is half of what is expected for either Heathrow scheme. Similarly, the noise assessment concludes LGW-2R scheme as being the scheme with the least negative noise effects (although still significant). Of the two Heathrow schemes, the LHR-NWR scheme is expected to offer reduced local and national exposure to the higher noise levels compared with the LHR-ENR scheme, but both schemes are expected to have predominant Significant Negative effects. The overall indirect effects on community viability as a result of the LGW-2R scheme are considered to be negative while the indirect effects as a result of both Heathrow schemes are considered to be significant negative.

## Objective 2: To avoid or minimise disproportionate impacts on any social group

- 6.3.4 Religious groups** - The LGW-2R scheme may have a disproportionate effect on the religious groups in the area selected for expansion. Northgate, Poundhill, Crawley, Rusper and Colgate and Horley Central have over 10% more Christians than the London average. Langley Green and Northgate have over 10% more Hindus than the London average. Langley Green has over 10% more Muslims than the London average. With the relocation of housing and of some community facilities, it has been considered that the additional journey times may disproportionately affect members of certain faith groups travelling to places of worship. The LHR-NWR and LHR-ENR will not require any relocation of religious buildings. However, the relocation of housing may differentially and disproportionately affect members of certain faith groups travelling to places of worship.
- 6.3.5 Black, Asian, and minority ethnic (BAME) communities** - In the study area for each of the three schemes, BAME populations tend to be 10% higher or more than regional and national averages. The loss of community facilities and housing may have a disproportionate effect on BAME residents. BAME communities are also likely to experience indirect disproportionate effects, in particular noise and air quality impacts. However, both Gatwick and Heathrow airports on-site workforces have a higher than average proportion of BAME staff when compared to the national average. Therefore all three schemes could have a positive disproportionate effect on BAME communities within the study area, creating employment opportunities matching the current skills of the population.
- 6.3.6 Age** – In the study area for each of the three schemes, the population tends to be younger than regional and national averages. Therefore there may be disproportionate effects on younger people in the area due to housing and community facilities loss and severance. The LGW-2R will require the loss of one park. The LHR-NWR will require the relocation of Harmondsworth Primary School as well as the loss of five playgrounds and four public open spaces. The LHR-ENR will not require any relocation of community facilities specifically for children but will require the loss of three public open spaces, including two playgrounds.
- 6.3.7 Deprivation** - In the study area for each of the three schemes, deprivation levels are lower than the national average but unemployment rates are noticeably above the national rate. It is expected that areas of relatively high unemployment could benefit from the additional resulting jobs from the expansion, resulting in a positive disproportionate effect on low-income groups. The jobs mix both at Gatwick and Heathrow is predominantly low skilled and accessible to those without having studied for higher-level qualifications. Therefore, there is the possibility of a relatively strong match between the new jobs which could be created and the current skills of the population. Moreover, current trends as regards airport direct employment suggest that there is capacity for some of these new jobs to be filled by unemployed people from the study areas. The number of jobs expected to be created, and the current rates of unemployment are generally higher around Heathrow than Gatwick.

Overall, both positive and negative effects of a similar nature are likely to be experienced by the communities surrounding all three airports. As a result, the potential effects of disproportionate impacts on any social group surrounding LGW-2R, LHR-ENR and LHR-NWR are considered to be negative.

## 6.4 QUALITY OF LIFE

### Objective 3: To maintain and where possible improve the quality of life for local residents and the wider population

- 6.4.1 The national, regional and local community profile and wellbeing baseline indicates that there is an anticipated increase in demand for housing and other services, and pressures on supply in line with the population growth that is expected.
- 6.4.2 The population profile across both study areas reflects a higher percentage of young people, and greater ethnic mix than the national average. Unemployment is above the national average.
- 6.4.3 According to a survey<sup>77</sup>, the population of the area surrounding Heathrow appear to experience lower levels of life satisfaction, lower levels of happiness and greater level of anxiety than the population in the area surrounding Gatwick. This implies that subjective Quality of Life is marginally better in the seven districts surrounding Gatwick airport than within the ten districts surrounding Heathrow airport.
- 6.4.4 This Quality of Life (QoL) assessment has found commonality between key QoL issues and those recognised within previous HIAs studies on airports. These include:
- Noise Impacts –from additional aircraft flights and ground movement, leading to annoyance and sleep disturbance for residents and impacts on children’s learning in schools;
  - Air Quality Impacts – degradation of local air quality from additional aircraft emissions, and airport road traffic;
  - Housing – reduction in access to housing, due to land take;
  - Community facilities – reduction in recreational amenities and access to community services;
  - Socio-economic - beneficial impacts both on employment opportunities;
  - Access to Nature and Cultural Heritage. - Loss of habitat and recreational outdoor space.
- 6.4.5 There are a wide range of mitigation options available to all three schemes, and these are explored in the relevant topic chapters.
- 6.4.6 Airport expansion will attract additional air traffic which impacts upon both QoL and wellbeing, in particular through noise and air quality pollution. Negative impacts upon QoL were of a greater scale within the two Heathrow expansion schemes, ENR and NWR, and of a lower magnitude for the LGW-2R scheme.
- 6.4.7 The objective of airport expansion, economic growth, is predicted to have an indirect positive impact upon QoL. The LHR -NWR scheme generates the most economic benefits. As well as producing the highest direct benefits to passengers (passengers will benefit from lower fares once current capacity constraints have been removed whilst also benefitting from greater air service frequencies), this scheme also returns the highest overall wider economic impacts across the impacts considered (trade, agglomeration, tax take and increased business output). The competitiveness of the UK economy will also be enhanced to the largest extent by the LHR -NWR scheme given the productivity benefits occurring as a consequence of enhanced trade and increased agglomeration as there will be more clustering of businesses near to the airport.

<sup>77</sup> Office for National Statistics, 2015. *Measuring National Well-being: Life in the UK*, 2015. [online]. Accessed: 13/05/2015.

6.4.8 Increased air traffic generates costs to society affecting QoL and wellbeing, in particular through noise and air quality pollution. Well designed, sustainable, integrated airports will reduce adverse impacts on QoL.

## 6.5 ECONOMY

6.5.1 As with any major infrastructure project, effects on the economy can be expected to arise during both construction and operation. The extent of any beneficial effects which are discussed within this assessment will depend on a number of key variables. These are presented as limitations and include:

- Social, economic and political developments which affect demand for airport use;
- Environmental regulations or mitigation which affect the operating schedule and frequency of the airport; and
- Other tax and regulation from government which affect operation or profitability of the airport.

### **AoS Objective 4: To maximise economic benefits and to support the competitiveness of the UK economy**

6.5.2 The economic impact work undertaken by the AC and DfT covers 'direct' and 'wider' economic benefits. These include the 'direct' benefits experienced by passengers and also providers of airport capacity, including through reduced delays, and increased frequency of flights. 'Wider impacts' include increased output in imperfectly competitive markets, change in tax revenue, and induced productivity benefits. The results of DfT's appraisal for both the carbon traded and carbon capped scenarios are shown in Table 6.3 below.

6.5.3 When assessed against the objective of maximising economic benefits and supporting competitiveness, the LHR -NWR and LGW-2R schemes generate similar total benefits, with the LHR-NWR scheme delivering them sooner. The LHR-NWR and LGW-2R schemes produce the highest direct benefits to passengers (passengers will benefit from lower fares and greater air service frequencies once current capacity constraints have been removed), and the LHR-NWR scheme also returns the highest overall wider economic impacts across the impacts considered. It should be noted that this does not include trade benefits, which are not treated as additional to the other wider economic impacts. Depending on the modelling approach undertaken, these range from being slightly higher under the LGW-2R scheme, to being substantially higher under the LHR-NWR.

6.5.4 The competitiveness of the UK economy would also be enhanced to the largest extent by the LHR-NWR scheme given the overall productivity benefits.

6.5.5 The results of DfT's appraisal are shown in Table 6.2 below. This covers both the 'Carbon Traded' and 'Carbon Capped' scenarios with the direct benefits shown separately to the wider economic impacts. The economy assessment considers two potential carbon policy futures, which affect aviation forecasts: carbon-traded and carbon-capped. Both scenarios deliver the same benefits as shown in Table 6.2, but the economy assessment also presents the additional cost of carbon abatement in the carbon-capped scenario. It also considers different passenger demand scenarios, including high, low and central growth scenarios. In order to simplify the presentation of the assessment, the central scenario is presented in the AoS, unless a range of scenarios are required, in which case high and low growth scenarios are presented.

**Table 6.2: Present Value (PV) of Economic Benefits, £ Billion, 2014 Prices<sup>78</sup>**

Economic Impact	Gatwick Second Runway	Heathrow Extended Northern Runway	Heathrow Northwest Runway
<b>Direct Impacts</b>			
Lower Fares*	64.5	54.5	64.3
Frequency Benefits*	4.0	2.6	3.0
Reduced Delays*	0.8	0.1	0.2
Total Producer Impact	-65.1	-46.4	-55.0
Government Revenue	4.6	2.9	3.5
<b>Wider Economic Impacts</b>			
Business outputs benefits	1.2	1.1	1.2
Tax wedge	-1.1 to 0.1	0.5 to 1.7	0.5 to 1.9
Trade**	10.9, 20.0, or 59.5	7.5, 14.3, or 106.6	8.8, 16.7, or 130.9
Total benefits (excluding trade and producer impacts)	74.1 to 75.3	61.7 to 62.8	72.8 to 74.2
* Combination of UK resident, Non UK Resident and International to International value.			
** Trade is not additional to the other economic benefits described above.			

6.5.6 The conclusions with respect to economic benefits and UK competitiveness are summarised below:

- The three shortlisted schemes have Significant Positive effects given the magnitude of direct and wider economic benefits predicted;
- The three shortlisted schemes were assessed as having Significant Positive effects given the likely productivity enhancements from increased trade around airports. Productivity improvements will be greater for the two Heathrow Airport schemes given the level of clustering that is already evident nearby.

#### **Objective 5: To promote employment and economic growth in the local area and surrounding region**

6.5.7 All three schemes will deliver improvements to surface access systems which are expected to accommodate additional passengers estimated. For both Heathrow schemes, in the short term, the improvements will provide improved and more varied travel options which will benefit communities, and improve access to employment centres. In the long term, any improvements to accessibility would be negated by the expansion of the airport and associated increase in passenger numbers. Further enhancements to the surface network would be required to ensure accessibility benefits are maintained in the long term. For Gatwick, there is expected to be little improvement in journey times with key employment centres.

6.5.8 DfT's *Updated Appraisal Report*<sup>79</sup> contains forecasts of the employment generated for each of the airport expansion schemes. Adding runway capacity at Heathrow and Gatwick is forecast to

<sup>78</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report* (published as part of the Revised Draft NPS consultation)

<sup>79</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report*

generate additional local employment via direct, indirect and induced jobs. Direct jobs are those associated with airport activity (either on-site or off-site) while indirect jobs are those in supply and support sectors. Induced employment is that supported by the spending of workers in direct and indirect employment.

- 6.5.9 DfT has generated a range of employment estimates for the number of local jobs created. Given the uncertainties associated with the type of airport and the size of the airport employment catchment areas, employment growth is likely to be between the estimates which are presented.

**Table 6.3 Local Employment Growth Projections Provided by the AC and the DfT<sup>80</sup>**

	Year	AC Final Report <sup>81</sup>	DfT Updated Appraisal Report <sup>82</sup>
<b>LGW Second Runway</b>	2030	12,500*	9,000 to 21,000
	2050	44,190*	25,000 to 60,000
<b>LHR Extended Northern Runway</b>	2030	76,650	48,000 to 97,000
	2050	65,610	31,000 to 63,000
<b>LHR Northwest Runway</b>	2030	76,650	57,000 to 114,000
	2050	78,360	39,000 to 78,000
<i>*Figures revised for consistency with the AC's stated method</i>			

- 6.5.10 Displacement impacts, whereby the employment generated is actually a transfer of workers from other areas, have not been quantified. This could mean that at a national level, local employment impact is counterbalanced by a net 'no change' impact if all the additional workers transfer from other jobs elsewhere.
- 6.5.11 As well as employment displacement impacts, increase in activity at one of the two airports to be expanded could reduce activity by a similar magnitude at another airport (an example would be reduced activity at one of the UK's regional airports, such as Birmingham Airport). These impacts will also need to be taken into account.
- 6.5.12 In the short term, some cumulative beneficial effects on accessibility are anticipated for all schemes. These are anticipated to arise due to improved service provision as a result of airport expansion surface access systems working in conjunction with other major infrastructure which is planned or under development. However, in the long term these benefits are expected to be neutralised by increases in demand.
- 6.5.13 With respect to promoting employment and economic growth, the following conclusions apply:
- LGW-2R, and both Heathrow schemes will have a Neutral effect on accessibility to local employment centres. Although new infrastructure will be provided, it is expected that any increase in provision will be offset by an increase in demand;
  - Given the estimated economic benefits at the local level, all three schemes have Significant Positive employment effects at the local level, primarily through job creation. This will be offset to some degree through displacement of employment from other areas in the UK.

<sup>80</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report* (published as part of the Revised Draft NPS consultation.)

<sup>81</sup> Airports Commission, 2015. *Final Report*. [online] Accessed 24/12/2015.

<sup>82</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report*

## 6.6 NOISE

### Objective 6: To minimise and where possible reduce noise impacts on human receptors

- 6.6.1 The noise assessment considers DfT's 2017 aviation demand forecasts for the three shortlisted schemes, alongside up-to-date baseline data.
- 6.6.2 The assessment of the potential aviation noise impacts generated by each scheme depends on the assumptions adopted in the prediction scenarios. There are two primary factors considered:
1. Future aviation demand;
  2. Flightpath strategies.
- 6.6.3 When considering future aviation demand, the AC adopted the assessment of need scenario as the starting point for its analysis of impacts. This is broadly consistent with the central scenario used in the Government's most recent aviation forecasts<sup>83</sup> in terms of its assumptions on drivers of future demand.
- 6.6.4 The noise assessment is based on the DfT 2017 central scenario assumptions wherever updated modelling data are available; where this data is not available it also uses the AC's AoN (carbon capped) data for other elements. In addition, the effects of a high demand scenario have also been examined, as a sensitivity test. Further details on scenario assumptions employed in the noise assessment are found in Appendix A-4.
- 6.6.5 The assumed flight path designs reflect those considered in the AC's *Final Report*<sup>84</sup>.

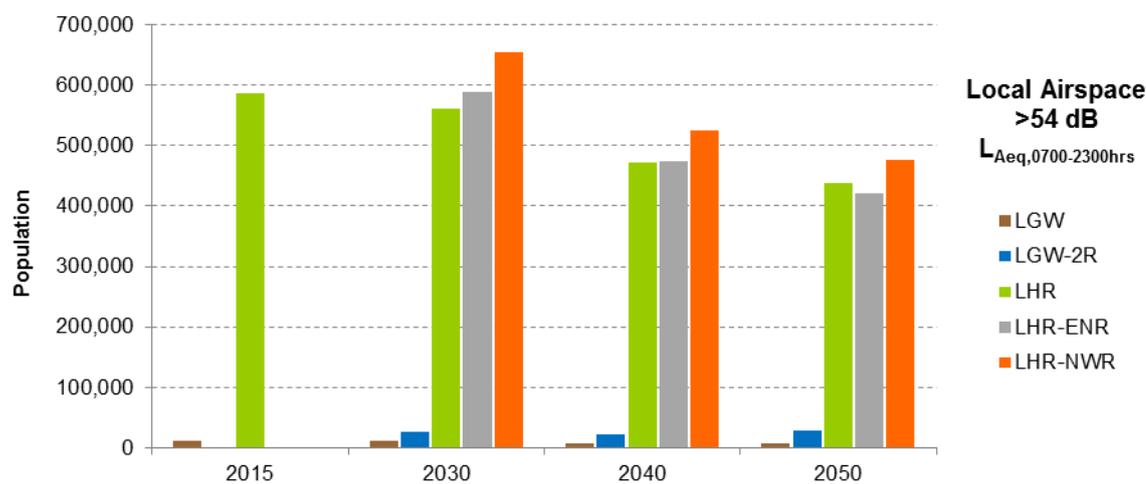
### NOISE EXPOSURE

- 6.6.6 The assessment considers noise exposure due to aircraft in flight (referred to as airspace noise) and airport ground activities (referred to as ground noise). This Report focuses on the expected changes in the local population exposed to airspace and ground noise due to each expansion scheme, along with consideration of the potential effects of exposure for health and amenity; changes in noise exposure at a national level are also considered in Appendix A-4.
- 6.6.7 The noise assessment in Appendix A-4 compares the predicted community exposures to a range of noise levels, representing key thresholds derived from national policy and aviation noise research (further explanation and discussion can be found in Appendix A-4). The summary in this Report presents results for exposure to airspace noise  $>54$  dB  $L_{Aeq,16hr}$  and exposure to ground noise  $\geq 57$  dB  $L_{Aeq,16hr}$ , but the overall conclusions of the noise assessment incorporate consideration of all assessed exposure indexes, as detailed in Appendix A-4. Similarly, a range of noise-related health and amenity effects are considered in Appendix A-4; this Report presents the combined total results, but the conclusions incorporate the wider consideration detailed in Appendix A-4.
- 6.6.8 The forecast exposure with expansion is referred to as the 'do something' (also designated as LGW-2R, LHR-ENR or LHR-NWR for each respective scheme), which is compared with the forecast exposure in the absence of expansion, referred to as the 'do minimum' (also designated as LGW or LHR).
- 6.6.9 Figure 6.1 presents the expected future total population exposures to airspace noise associated with each scheme, alongside the current baseline situation.

<sup>83</sup> Department for Transport, 2017. *UK Aviation Forecasts 2017*

<sup>84</sup> Airports Commission, 2015. *Final Report*. [\[online\]](#) Accessed 24/12/2015.

**Figure 6.1: Comparison of LGW-2R, LHR-ENR & LHR-NWR Local Airspace >54dB  $L_{Aeq,16hr}$  Daytime Average Noise Total Population Exposures (Central)**



### LGW-2R

6.6.10 The numbers of additional people in the local population exposed to the >54 dB  $L_{Aeq,16hr}$  noise contour as a consequence of the expansion at an expanded Gatwick is predicted to be 16,200 people by 2030, 14,700 people by 2040 and 21,300 people by 2050<sup>85</sup>.

6.6.11 The ground noise assessment for LGW-2R (see Appendix A-4) indicates that population exposure to ground noise levels<sup>86</sup>  $\geq 57$  dB  $L_{Aeq,16hr}$  is expected to be lower by 2,150 by 2030, due to reductions in taxiing, enabled by the new terminal and aprons between the runways following expansion<sup>87</sup>.

### LHR-ENR

6.6.12 The changes in numbers of people in the local population who are predicted to be exposed to the >54 dB  $L_{Aeq,16hr}$  noise contour as a consequence of a northern runway extension expansion at Heathrow is predicted to be 27,200 in 2030, 1,300 in 2040 and -18,200 (ie a reduction compared with the LHR do minimum) in 2050<sup>88</sup>.

6.6.13 The local ground noise assessment for LHR-ENR (see Appendix A-4) indicates that population exposure to ground noise levels >57 dB  $L_{Aeq,16hr}$  is expected to be lower by 1,450, due to the relocation of some sources or receptors of ground noise<sup>89</sup>.

### LHR-NWR

6.6.14 The numbers of additional people in the local population predicted to be exposed to the 54 dB  $L_{Aeq,16hr}$ , as a consequence of the third runway at an expanded Heathrow is 92,700 people by 2030, 52,900 people by 2040 and 36,800 people by 2050<sup>90</sup>.

<sup>85</sup> CAA ERCD, 2017. 20170904 Gatwick Central and High Results. Data provided for updated DfT analysis.

<sup>86</sup> The 57 dB  $L_{Aeq,16hr}$  contour is used for ground noise according to available data, and is consistent with the simplified methodology used by the AC for assessing ground noise.

<sup>87</sup> Jacobs, 2014. 5. Noise: Local Assessment, p. 69, paragraphs 1-2. [online] Accessed 21/12/2015.

<sup>88</sup> CAA ERCD, 2017. 20170904 Heathrow HH and 3R Central and High Results. Data provided for updated DfT analysis.

<sup>89</sup> Jacobs, 2014. 5. Noise: Local Assessment, p. 271, paragraph 3. [online] Accessed 21/12/2015.

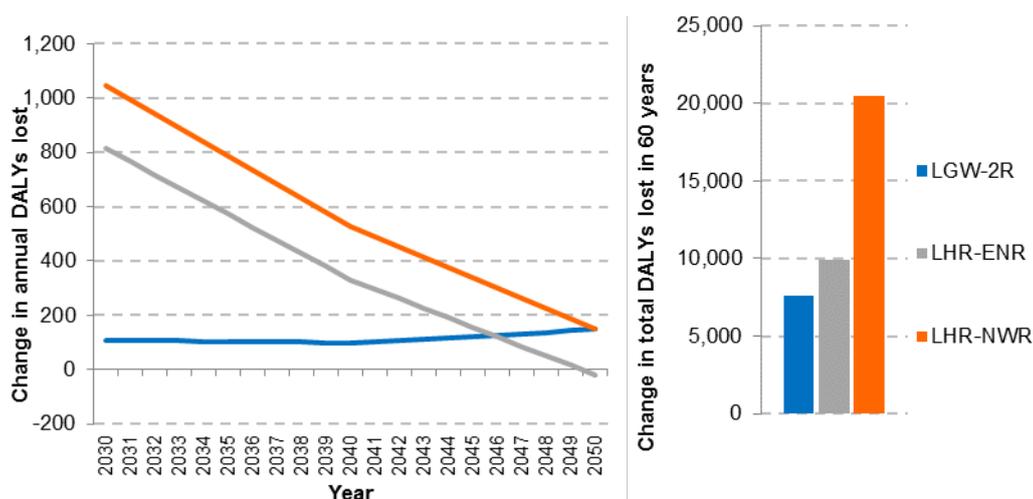
<sup>90</sup> CAA ERCD, 2017. 20170904 Heathrow HH and 3R Central and High Results. Data provided for updated DfT analysis.

- 6.6.15 The ground noise assessment for LHR-NWR indicates that the population exposure to ground noise >57 dB  $L_{Aeq,16hr}$  is expected to be lower by 3,750. This is due to relocation of some sources of ground noise away from more densely populated areas<sup>91</sup>.

## EFFECTS OF NOISE EXPOSURE ON HEALTH AND AMENITY

- 6.6.16 In addition to quantifying noise exposure, an assessment of the implications for possible adverse health and amenity effects has also been conducted using the DfT WebTAG framework for analysis<sup>92</sup>. This assessment is based on examining the impact of noise on Disability-Adjusted Life Years<sup>93</sup> (DALYs) lost due to the health and amenity effects considered. This assessment considers the noise-related effects of annoyance and sleep disturbance (considered as amenity effects or health effect pathways), together with heart disease leading to acute myocardial infarction (AMI, ie heart attacks), and hypertension (high blood pressure) contributing to stroke or dementia (considered as health effects).
- 6.6.17 As shown in Figure 6.2, the assessment of noise-related health and amenity effects indicates that LGW-2R is expected to generate the least overall negative impact over a 60-year period, although all schemes are expected to cause overall increases in lost DALYs due to noise exposure over a 60-year period.
- 6.6.18 Figure 6.2 also shows estimated annual changes in DALYs lost in the period 2030-2050. This analysis indicates that annual increases in lost DALYs are broadly steady for LGW-2R up to 2040, with a slight increasing trend to 2050. On the other hand, both LHR-ENR and LHR-NWR show larger initial increases, combined with steadily decreasing numbers of additional annual DALYs lost. In the case of LHR-ENR, this decrease is sufficient to bring the total annual change in DALYs into a reduction by 2050, whereas those for LHR-NWR reduce to be approximately the same as those for LGW-2R. Overall, LHR-NWR shows the largest negative impacts on health and amenity.

**Figure 6.2: Estimated Changes in Total DALYs Lost Due to All Assessed Health and Amenity Effects Compared with Do Minimum (Central)**



- 6.6.19 The more detailed analysis of potential health effects in Appendix A-4 shows that annoyance is the dominant effect expected in all cases. The analysis also indicates that the expansion at

<sup>91</sup> Jacobs, 2014. 5. *Noise: Local Assessment*, Prepared for the Airports Commission, p. 197. [online] Accessed 21/12/2015.

<sup>92</sup> Department for Transport, 2015. *TAG Unit A3 Environmental Impact Appraisal*. [online]. Accessed 04/07/2016.

<sup>93</sup> A measure used internationally to quantify human health impacts. See WHO definition at: [http://www.who.int/healthinfo/global\\_burden\\_disease/metrics\\_daly/en](http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en)

Heathrow (whether LHR-ENR or LHR-NWR) may lead to future reductions in sleep disturbance (compared with the do minimum).

- 6.6.20 With respect to cognitive development of children, the assessment in Appendix A-4 indicates that LGW-2R performs most strongly as it is expected to result in some reductions as well as increases in noise exposure of schools. Both LHR schemes perform very similarly, and show predominant significant negative effects, with possible slight positive effects at the lower end of the noise exposure range.
- 6.6.21 In conclusion, the LGW-2R presents the scheme with the least negative effects in relation to the Noise topic objective, and may offer some positive effects. The total exposure increases and the total negative impact on health and amenity are expected to be considerably smaller for LGW-2R, relative to that of either LHR-ENR or LHR-NWR.
- 6.6.22 Of the two Heathrow schemes, the LHR-NWR scheme is expected to offer reduced local and national exposure to the higher noise levels compared with the LHR-ENR scheme, but increased local exposure to the lower bound noise contour  $>54$  dB  $L_{Aeq,16h}$ .
- 6.6.23 It is recognised that both LHR schemes are expected to offer reductions in sleep disturbance compared with the do minimum, but this is not expected to occur until after 2040. Overall, LHR-ENR performs better than LHR-NWR for both the key amenity effects in the long term (annoyance and sleep disturbance).
- 6.6.24 In this analysis it is important to emphasise that the estimations are of changes in health effects relative to the respective do minimum, and do not represent the total health and amenity effects that might be associated with the operations of individual airports. Due to the much lower total population exposures, the overall impact of aviation noise on human health and amenity associated with Gatwick is expected to be lower than at Heathrow, with or without expansion.

## SENSITIVITY ANALYSIS

- 6.6.25 A test of sensitivity has been conducted with respect to noise, to determine the risk of differing assessment outcomes caused by an assumed increased demand for air travel. This 'high demand' sensitivity test is detailed in Appendix A-4. Adoption of the high demand scenario has the general effect of increasing numbers of people exposed to and affected by noise.
- 6.6.26 The effect of this higher demand scenario has been considered in terms of population noise exposure and associated impacts on health. The outcome suggests that the negative effects identified for LGW-2R could be slightly larger than estimated under the central scenario, but that this difference would not affect the individual LGW-2R scheme assessment outcome. The effect of the high demand scenario on the Heathrow schemes is to increase the total numbers of people exposed to noise, but in terms of the impact relative to the LHR do minimum case, both LHR-ENR and LHR-NWR show reduced levels of impact under the high demand scenario compared with the central scenario. The explanation for this is that the high demand assumptions affect both do something (ie with expansion) and do minimum (ie no expansion) cases. In the case of LHR, the high demand scenario increases the exposure numbers (relative to the central scenario) more in the do minimum than in the do something, so the impacts relative to the do minimum are reduced.
- 6.6.27 This situation is also reflected in the health and amenity outcomes assessed, so that, whereas the total DALYs lost for LGW-2R increase slightly in the high demand scenario, those for LHR-ENR and LHR-NWR slightly decrease. In particular, the beneficial reductions in sleep disturbance for both Heathrow schemes become larger in the high demand scenario. It is inferred that, since in the do minimum case, daytime capacity cannot increase due to current constraint, more ATMs must be fitted into night-time shoulder hours to meet the high demand, resulting in higher night-time average exposure to aircraft noise at LHR. On the other hand, both Heathrow expansion options should enable more flexibility with regards to distribution of the higher demand throughout

the day, leading to reductions in night noise relative to a constrained (do minimum) Heathrow airport.

- 6.6.28 The conclusion of the sensitivity test is that LHR-NWR remains the scheme with the greatest negative impact for noise-induced health and amenity effects. However, for LHR-ENR, the changes result in a marginally lower value for total 60-year DALYs lost than the equivalent for LGW-2R (8,084 compared with 8,101 respectively). Overall this is not sufficient evidence to affect the comparative assessment outcome, since the increases in noise exposure are larger under LHR-ENR compared with LGW-2R, with LGW-2R remaining the more favourable in the high demand scenario.

## 6.7 BIODIVERSITY

### AoS Objective 7: To protect and enhance designated sites for nature conservation

- 6.7.1 All three schemes have the potential to result in Adverse Effects to European Sites. For LGW-2R the effects are largely indirect and resultant of surface access. For LHR-ENR and LHR-NWR a range of effects have been identified for South West London Water Bodies (SWLW) along with a number of sites that are subject to indirect effects due to surface access.
- 6.7.2 On the basis of information that is available or can be reasonably obtained, and in accordance with the Precautionary Principle, it has not been possible to rule out adverse effects on the integrity of Natura 2000 sites, either alone or in combination with other plans and projects, having regard to each site's conservation objectives. Mitigation has the potential to address some of these effects however it is not certain at this time with the information available that all the effects can be avoided through mitigation alone. Where mitigation does not result in an absence of adverse effects on integrity, both alone and in-combination, further assessment of the Policy has been undertaken pursuant to Stages 3<sup>94</sup> and 4<sup>95</sup> of the HRA process.
- 6.7.3 In the event that compensation is required (subject to meeting the tests under Stages 3 and 4 of the HRA process) there could be significant challenges in delivering appropriate compensation due to conflicts arising from operational management. Options for addressing this are considered in the HRA and will need further consideration in the project level assessment.
- 6.7.4 All three schemes have the potential to result in likely significant effects to Site of Special Scientific Interest (SSSI). The assessment of impacts to SSSI at this stage is not comprehensive and will require much more detailed consideration at the detailed design stage. This would require seasonal habitat and species surveys, land access and detailed development plans so that direct and indirect effects are better understood.
- 6.7.5 In the case of LGW-2R these effects are indirect and associated with air and water quality changes. The potential impacts could occur both alone and in-combination. Air and water quality changes could result in adverse effects to the habitats and species interest features of these sites. Surface access proposals for the scheme could have potential impacts due to land take and disturbance at a small number of non-statutory sites adjacent to the M23 motorway, in the general area of Junction 9A- Sites initially identified are Bridges Wood proposed Site of Nature Conservation Interest (pSNCI), Bridges Fields pSNCI and The Roughs SNCI, all of which carry a degree of importance for biodiversity at the local level.
- 6.7.6 For LHR-ENR and LHR-NWR the schemes could result in permanent adverse impacts on SSSI.

<sup>94</sup> Assessment of alternative solutions: the process which examines alternative ways of achieving the objectives of the plans or projects that avoid adverse impacts on the integrity of the Natura 2000 site

<sup>95</sup> Assessment where no alternative solutions exist and where adverse impacts remain: an assessment of whether the development is necessary for imperative reasons of overriding public interest (IROPI) and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.

- 6.7.7 The LHR-ENR scheme would result in a direct impact due to land take from the Staines Moor SSSI from the LHR-ENR proposals, comprising the loss of Unit 1 (Poyle Meadow, 8.74ha) of the SSSI. Based on scenarios presented in the scheme there is potential for indirect impacts on Unit 12 of Staines Moor SSSI from works affecting the River Colne, this could lead to the loss of 40ha of the SSSI.
- 6.7.8 The LHR-ENR scheme also has the potential for indirect impacts on the following SSSIs from air and water quality changes; Staines Moor SSSI, Wraysbury Reservoir SSSI, Wraysbury No.1 Gravel Pit SSSI, Wraysbury and Hythe End Gravel Pits SSSI, and Kempton Park Reservoirs SSSI. The potential impacts could occur both alone and in-combination. Air and water quality changes could result in adverse effects to the habitats and species interest features of these sites.
- 6.7.9 Surface Access Proposals for LHR-NWR may involve land take and disturbance in the southern area of the proposal, primarily along the existing M25 motorway corridor. There is potential for surface access routes to overlap with the boundaries of sites that include SSSI components of the SPA and other potential functionally linked habitat.- Applying a buffer zone of 100m as a potential area of impact around the proposed surface access routes has identified some potential overlap with the boundaries of sites that include Staines Moor SSSI and Wraysbury Reservoir SSSI (and therefore the SWLW SPA).
- 6.7.10 The LHR-NWR scheme also has the potential for indirect impacts on the following SSSIs from air and water quality changes; Staines Moor SSSI, Wraysbury Reservoir SSSI, Wraysbury No.1 Gravel Pit SSSI, Wraysbury and Hythe End Gravel Pits SSSI, and Kempton Park Reservoirs SSSI. The potential impacts could occur both alone and in-combination. Air and water quality changes could result in adverse effects to the habitats and species interest features of these sites.
- 6.7.11 All three schemes have the potential to result in adverse effects to local designated sites.
- 6.7.12 The LGW-2R scheme involves direct land take impacts on two local designated sites, one statutory (Willoughby Fields SNCI/ Local Nature Reserve (LNR)), one non-statutory (Rowley Wood SNCI). The majority of the area of these two sites would be lost. Further losses may occur at Horleyland Wood SNCI.
- 6.7.13 The LHR-ENR scheme includes the potential for direct land take due to surface access requirements of 4.1ha from Arthur Jacob LNR, 2.9ha from East Poyle Meadows SNCI, 0.45ha from Greenham's Fishing Pond Site of Importance to Nature Conservation (SINC), 10-15ha from Lower Colne Site of Metropolitan Importance for Nature Conservation (SMINC), and 1.25ha from the River Colne.
- 6.7.14 The LHR-NWR scheme involves direct land take impacts on three local non-statutory designated sites (Old Slade Lake Local Wildlife Site (LWS), Lower Colne SMINC and Stanwell II SNCI).
- 6.7.15 All three schemes are considered to result in Significant Negative effects. When assessed against objective 7 it is considered the LHR-ENR scheme could result in the greatest level of adverse effects to the range of designated sites considered and LGW-2R could result in lowest level of adverse effects to designated sites.

**AoS Objective 8: To conserve and enhance undesignated habitats<sup>96</sup>, species, valuable ecological networks and ecosystem functionality.**

- 6.7.16 LGW-2R would result in loss of lowland mixed deciduous woodland, including significant loss of ancient woodland; hedgerow including ancient hedgerow; rivers and brooks including canalised or conduited channel; and ponds. The existing habitat comprises of woodland of various sizes with a series of interconnecting hedgerows-which are also a priority habitat. The existence of the network of hedgerows joining various woodland blocks provides a functioning habitat throughout this landscape. The loss of such a large extent of this functioning habitat would therefore occur and require consideration on a landscape scale. The scheme could result in air quality impacts on ancient woodland blocks adjacent to affected roads.
- 6.7.17 The Low Weald National Character Area (NCA) in which the LGW-2R scheme is proposed is amongst the most important areas for bats in terms of species diversity and includes internationally important populations of Bechstein's associated with designated sites. The habitat losses occur at a distance from the designated sites (10 km) that exceeds the current known foraging of Bechsteins (typically 3km, although more recent findings for the HS2 development have identified foraging distances of up to 7 km). Under current understanding, habitat loss and fragmentation of woodlands and hedgerows within this zone have the potential to impact this species.
- 6.7.18 The following priority habitats would be affected as a result of the LHR-ENR scheme; deciduous woodland, traditional orchard, rivers and brooks, reedbeds and lowland meadows.
- 6.7.19 The following priority habitats would be affected as a result of the LHR-NWR scheme; deciduous woodland, traditional orchard, rivers and brooks, reedbeds and lowland meadows.
- 6.7.20 All three schemes would be likely to result in adverse effects to protected species and species of principal importance. It is considered likely that the all three schemes have the potential to support a range of species protected under UK (and EU) wildlife legislation including but not limited to bat species, dormice, and great crested newts. In addition it is likely the area will support species protected under the Wildlife and Countryside Act 1981 and species of principal importance as identified under Section 41 of the NERC Act 2006.
- 6.7.21 There are birdstrike management issues for the LHR-ENR and LHR-NWR schemes associated with the nearby complex of open water bodies. The western threshold of the extended runway will be significantly closer to the complex of reservoirs and gravel pits to the west of the airport (including sites designated as part of the SWLW SPA and Ramsar site). The closer proximity of the runway and increased air traffic is likely to result in an increased strike risk, and a corresponding requirement for an increase in bird management and control activities is anticipated. Methods of deterring/scaring and controlling bird species potentially hazardous to aviation operations could potentially have an adverse effect on non-target species and biodiversity including those not listed on the designation interest features.
- 6.7.22 For LHR-ENR and LHR-NWR bird management measures present a range of complex challenges both in terms of avoiding impacts but also in the siting of any compensation habitats.
- 6.7.23 Given the scope of the proposals all three schemes would be likely to increase the exposure of wildlife to transport noise, air pollution, and water pollution.
- 6.7.24 All three schemes are considered to result in Significant Negative effects. When assessed against objective 8 based on the information and excluding species linked to designated sites it is considered at this stage, with the information available at this time that the LGW-2R scheme

<sup>96</sup> Habitats that are not designated for nature conservation which are covered by previous Objective 7.

could result in the greatest level of adverse effects to undesignated habitats, species, valuable ecological networks and ecosystem functionality. There is considered to be negligible difference between the LHR-ENR and LHR-NWR schemes.

- 6.7.25 Overall, all three schemes result in Significant Negative impacts, based on the information available at this time there is no preference in relation to the biodiversity objective.

## 6.8 SOIL

### Objective 9: To protect sites designated for geodiversity

- 6.8.1 No significant impacts on Geological SSSIs (as opposed to those designated for nature conservation) or Regionally Important Geological and Geomorphological Sites (RIGS) are expected for any of the expansion schemes. All effects were assessed as neutral.

### Objective 10: To minimise loss of undeveloped soils and of Best and Most Versatile agricultural land, and protect soil against erosion, contamination and degradation

- 6.8.2 Greenfield (including agricultural land) is a finite resource, and its loss cannot be compensated through provision of land elsewhere. The following quantity of agricultural land would be lost for each scheme:
- LGW-2R: 421 ha.
  - LHR-ENR: 371 ha.
  - LHR-NWR: 431 ha.
- 6.8.3 The loss of agricultural land would typically be financially compensated for rather than mitigated against. However, whilst it would be possible to compensate for the financial loss, this would not address the effects associated with this loss of resource for food provision and other benefits. Of the agricultural land lost, at least 50% of the Heathrow schemes, and up to 60% at Gatwick is likely to be Best Most Versatile (BMV) agricultural land.
- 6.8.4 All of the schemes would result in a significant negative effect on agricultural land due to the scale of irreversible loss. However, LHR-NWR has the greatest amount of agricultural land lost followed by LGW-2R and then LHR-ENR with least loss.
- 6.8.5 Construction and operational activities have the potential to pollute soils. Development of land will affect soil resources. Effects include physical loss of and damage to soil resources associated with land contamination from potential substance release and structural damage from potential compaction, burial, mixing, etc. Indirect impacts may also arise from changes in the local water regime, organic matter content, soil biodiversity, and soil process.
- 6.8.6 Mitigation will be incorporated within design, and best practice construction measures which will reduce the potential for contamination or loss of soil resources through contamination. It is anticipated that best practice measures, which will be set out at detailed design, will avoid the creation of pathways to other sensitive environmental features. Potential adverse effects associated with contamination or degradation of soil resources are negative.
- ## 6.9 WATER
- 6.9.1 The three proposed schemes would all impact the water environment in different ways, some of the impacts have the potential to be similar for example the discharge of waters contaminated with de-icer, whereas for some impacts there is a clear variation in the degree of impact between the schemes for example the Heathrow schemes both involve significantly greater impacts upon existing waterbodies and flood risk.

### **AoS Objective 11: To protect the quality of surface and ground waters, and use water resources sustainably**

- 6.9.2 All the schemes increase the risk to the water environment especially in regards to quality of the surface and groundwaters mainly through the discharge of waters contaminated with de-icer along with hydrocarbons and other pollutants. In addition there are cumulative risks such as that of the historic landfill within the footprint of the LGW-2R scheme, which could lead to adverse impacts during construction. All schemes make a commitment to use water resources efficiently and incorporate measures within the terminal building(s) to reduce water use along with rainwater harvesting.
- 6.9.3 Gatwick will have some benefits from the deculverting work (600 m of the 7km of watercourse alterations), while the two LHR schemes require increased culverting of watercourses. A provisional estimate of the LHR-NWR scheme shows that approximately 3 km (of the total 12 km of watercourse alterations) of currently open channels would be culverted by the proposals, whereas the LHR-ENR scheme would lead to approximately an additional 12 km of culvert. The extent of culverting for either of these schemes is unusual as the current policy of the Environment Agency is to minimise the length of culverts. It is not possible to mitigate many of the effects of culverts of this length and challenging to offset the impacts. Instead the impact would have to be compensated for through the provision of enhancement of alternative water environment attributes such as additional fish habitats, ponds etc.
- 6.9.4 The size and nature of all three proposed schemes mean that they will all require the modification of watercourses. However, the modification at Gatwick would be significantly less than at Heathrow. Modifications of open water bodies are not necessarily detrimental especially as many of the existing features are highly channelized. New modified watercourses can be designed to bring an engineered feature back to its original state.
- 6.9.5 All three schemes by their nature will lead to an increase in the consumption of available water resources. The Water Resources Management Plan (WRMP) for the relevant water companies shows that there is sufficient capacity. Further assessment as to the long term environmental impacts of abstractions will be undertaken should new/modified licences be required. All of the schemes include measures such as rainwater harvesting to reduce the reliance and need upon abstracted water.
- 6.9.6 The LHR-ENR scheme is considered to perform the worst in relation to this Objective as there is far higher potential for different watercourses to be combined (e.g. into one channel) as they are realigned and partially culverted, resulting in a significant reduction in available habitat.
- 6.9.7 It should be noted that there is a potential conflict between the need to manage bird strikes for which the introduction of new open watercourses is a negative impact. The alternatives for managing this will most likely also include netting of open water bodies something that potentially will have a detrimental impact on the water environment especially the management of water bodies.
- 6.9.8 For all three schemes, ecosystem services will be affected in the short to medium term at least, until mitigation is established. Ecosystem services include the provision of freshwater supply which will be disrupted and reduction in the capacity to purify water.
- 6.9.9 The assessment has found that all three of the schemes would result in deterioration of the water environment particularly in terms of the WFD, in which all schemes would be required to progress through the Article 4.7 (of the WFD) route which requires a case to be proven that any environmental damage is outweighed by a greater public need (for an airport development).
- 6.9.10 Article 4.7 is the ultimate stage in the WFD assessment and is implemented when all design processes have been exhausted and no technically feasible or economically viable alternatives have been identified. The assessment process has not yet reached this stage and is considering

potentially viable schemes at a plan level. Appendix B outlines the long-list of alternatives considered by the AC and this report considers the three short-listed schemes. Proposals in the long list in Appendix B have been discounted for a number of reasons including strategic fit, economic impact, surface access requirements, environmental impact, passenger requirements, cost, operational viability and delivery risk. It is clear from the assessment that based on the current design solutions Article 4.7 would be need to be carried out for each of the schemes if they were to be developed. This is because all schemes incorporate an effective barrier to passage in both water and ecological terms which would result in a decrease in waterbody status under the WFD. Project level design would need to determine whether the detrimental impact can be mitigated, offset and where a like for like replacement is not possible, compensation within a wider environmental framework should be provided.

**AoS Objective 12: To minimise flood risk and ensure resilience to climate change.**

- 6.9.11 All the schemes incorporate high level surface water drainage strategies to demonstrate that they can provide a robust approach to providing the required attenuation. All the promoters have approached this differently and there are elements of each which will need to be refined during detailed design, particularly those which rely on pumping, to demonstrate not only that sufficient pump rates and resulting storage can be achieved but also that exceedance flows can be managed. Some of the schemes will need to refine their approach to the calculations of greenfield runoff and the resulting storage volumes. Overall the LGW-2R scheme is the most detailed and the potential for an exemplar surface water management scheme is provided, while the LHR-ENR scheme is the least detailed. However, it is acknowledged that there is potential for all three schemes to improve surface water management through detailed design having regard to current standard practice mitigation which it is assumed will be applied as a minimum .
- 6.9.12 The schemes all demonstrate how the operational sites will be defended but there are losses of flood plain storage in the immediate locality in all cases. Loss of flood plain storage may lead to an increase in the area outside the airport that is affected by flooding. The Gatwick scheme has solutions in place to deal with the impacts up till 2085. LHR-ENR would lead to a significant loss of flood plain while LHR-NWR will be able to increase the amount of flood plain storage and therefore may even be able to have a positive impact on the local flood risk.
- 6.9.13 The schemes all demonstrate how they will minimise their risks to climate change, particularly looking at flood risk to the site and elsewhere, surface water runoff rates and potable water supply. Gatwick provides clear evidence of how they intend to manage this while the two Heathrow schemes are giving inconclusive evidence in how they intend to give consideration to the Terrace Gravels and associated groundwater. This is important as climate change may impact the associated flood risk or associated water quantity.
- 6.9.14 In terms of flood risk, water quality and quantity all the schemes have impacts to varying degrees for which mitigation is proposed. No one scheme stands apart from the others in terms of a lower impact on the water environment apart from LHR-ENR which is worse in terms of the magnitude of the flood risk impact which means it has been assessed as a Significant Negative effect. For all three schemes, ecosystem services in relation to loss of flood storage, will be affected in the short to medium term at least until mitigation is established.

## 6.10 AIR QUALITY

**Objective 13: To improve air quality and reduce emissions consistent with EU, national and local standards and requirements.**

- 6.10.1 The principal metrics considered in terms of air quality were:
- Change in total emissions to air and compliance with emissions ceilings
  - Change in population exposure to air pollution and compliance with UK objectives
  - Change in air quality over sites designated for nature conservation
  - Impacts on compliance with EU Directive limit values for ambient air quality
- 6.10.2 Impacts during construction were considered but no significant effects from emissions of dust and particulate matter were anticipated.

### CHANGE IN TOTAL EMISSIONS

- 6.10.3 All schemes result in an increase in emissions to air, from both airside and landside activities.
- 6.10.4 The UK also has obligations to reduce emissions under the Convention on Long-range Transboundary Air Pollution (as extended by the Gothenburg Protocol) and the EU National Emission Ceilings Directive (NECD) (2016/2284) (amending Directive 2003/35/EC and repealing Directive 2001/81/EC).
- 6.10.5 UK emissions of NO<sub>x</sub> are expected to meet the 2020 Gothenburg Protocol target in 2030 but are currently projected to exceed the 2030 NECD targets, regardless of the shortlisted scheme taken forwards, but the increase with the schemes is a very small fraction of the target. UK emissions of PM<sub>2.5</sub> in 2030 are currently projected to exceed both the 2020 Gothenburg Protocol target and the 2030 NECD target regardless of the scheme taken forwards but, as for NO<sub>x</sub>, the increase with the schemes is a very small fraction of the target.
- 6.10.6 The schemes are predicted to increase emissions of NO<sub>x</sub> from the Traffic Model Simulation by up to 0.6%, and PM<sub>2.5</sub> emissions by up to 0.12% of the forecast emissions for 2030.

### CHANGE IN POPULATION EXPOSURE AND COMPLIANCE WITH OBJECTIVES

- 6.10.7 With the schemes, exposure to pollution is increased at between 20,985 properties (LGW-2R, by an average of 2.1 µg/m<sup>3</sup> NO<sub>2</sub> in the AC's 2030 modelling) and 47,063 properties (LHR-NWR, by an average of 0.9 µg/m<sup>3</sup> NO<sub>2</sub> in the AC's 2030 modelling). However, annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations with any of the schemes in place are predicted by the AC to remain below the UK's annual mean objective at all receptors considered in 2030. With opening of any scheme in years prior to 2030, the risk that the objective for annual mean NO<sub>2</sub> could be exceeded, increases.
- 6.10.8 There is a risk of cumulative effects on air quality from each of the proposed shortlisted schemes in combination with other major infrastructure development delivered in support of the National Networks National Policy Statement, or residential, commercial or infrastructure development associated with nearby local authority's plans for growth, delivered in support of local development plans.

## CHANGE IN AIR QUALITY OVER SITES DESIGNATED FOR NATURE CONSERVATION

- 6.10.9 Air quality impacts on ecological sites are assessed in relation to critical loads (relating to nitrogen deposition) and critical levels (relating to the concentration of NO<sub>x</sub> in ambient air).
- 6.10.10 None of the proposed schemes are predicted to cause new exceedances of the critical loads for nitrogen deposition at designated habitats. LGW-2R is, however, predicted to worsen existing exceedances of critical loads over designated sites including Mole Gap Special Area of Conservation (SAC).
- 6.10.11 Furthermore, LHR-NWR and LHR-ENR are predicted to cause new exceedances of critical levels at the South West London Waterbodies RAMSAR/Special Protection Area and the Wraysbury Reservoir Site of Special Scientific Interest.
- 6.10.12 These impacts potentially result in significant negative effects of internationally designated sites for nature conservation<sup>97</sup>.

## EU DIRECTIVE LIMIT VALUE COMPLIANCE

- 6.10.13 WSP undertook an updated re-analysis of the AC's air quality assessment in relation to EU limit value compliance, taking into account the Government's 2017 Air Quality Plan<sup>98</sup>.
- 6.10.14 The conclusion of the re-analysis was that LGW-2R is at low risk of impacting on the UK's compliance with EU Directive limit values.
- 6.10.15 The re-analysis demonstrated that neither LHR-ENR with updated surface access strategy nor LHR-NWR impact on modelled compliance with the EU Directive limit values. However, given the inherent uncertainties associated with air quality modelling, there remains a risk that the options could impact on compliance. The risk increases the earlier the assumed opening year. The risk is high in 2026, reducing to medium by 2030, when projected concentrations with the schemes fall below 90% of the limit value in the core forecasts (with 2017 Plan actions) and below 95% of the limit value in the baseline scenarios.
- 6.10.16 Without the updated surface strategy (Iteration 3), LHR-ENR is likely to impact on compliance with limit values.
- 6.10.17 The risks of impacting on limit value compliance results in significant negative effects in relation to compliance with EU legislation for LHR-ENR and LHR-NWR. The low risk of impact for LGW-2R results in a negative effect.
- 6.10.18 Mitigation for the preferred scheme is discussed in section 7 below, but for context, the direct mitigation of airport impacts, with measures considered by the AC (either proposed by the promoters or the AC), reduces the risks of impacts in the immediate vicinity of the airport. However, impacts on compliance with limit values are seen both in the vicinity of the schemes and, for LHR-ENR and LHR-NWR, in central London. Similarly, impacts on ecological receptors occur both near and at some distance from the schemes.
- 6.10.19 Reductions in risk of impacts in central London, from either LHR-NWR or LHR-ENR (with updated surface access strategy) primarily rely on the mitigation of impacts from vehicle emissions on the overall and wider road network (measures undertaken by local and national government) rather

<sup>97</sup> WSP, October 2017, *Airports NPS Habitats Regulations Assessment*, published as part of the Revised Draft NPS consultation.

<sup>98</sup> WSP, October 2017, *2017 Plan Update to Air Quality Re-Analysis*, published as part of the Revised Draft NPS consultation.

than mitigation of the impact of the airport expansion scheme alone. Similarly, reductions in risks to ecological receptors also rely on reduction in vehicle emissions on the wider road network.

- 6.10.20 The mitigations considered by the AC are not exhaustive and more ambitious strategies may be available but any such strategies must be seen in the context of air quality in the wider area. The principal driver for reducing adverse air quality impacts will be the actions in the Government's 2017 Plan, to be undertaken at local, regional and national levels.

## 6.11 CARBON

### Objective 14. To minimise carbon emissions in airport construction and operation

- 6.11.1 The AC modelled future carbon emissions relating to air travel, passenger surface access, the operation of airport buildings and infrastructure, fuel use and construction-related carbon emissions under two climate change policy scenarios, compared to futures without expansion. The DfT has updated all relevant emissions forecasts. The DfT used a similar approach to that used by the AC with two notable differences. Firstly the adoption of a carbon-capped scenario that uses a combination of both carbon pricing and specific measures to limit carbon to the CCC's planning assumption, as opposed to using only a carbon price. Secondly, the addition of the CO<sub>2</sub> emissions resulting from staff surface access to the assessment. Because carbon is abated using specific measures as opposed to raising the carbon price, passenger demand is the same under both carbon policy scenarios.
- 6.11.2 The DfT modelled emissions for both Gatwick and Heathrow Airports without expansion over a 60-year period from 2025/2026 to 2085/2086 for both carbon-capped and carbon-traded policy scenarios.
- 6.11.3 The DfT then modelled the likely future emissions of the two airports over the same period, under the three shortlisted schemes proposed by the promoters.
- 6.11.4 Two carbon policy scenarios were studied, each of which represents a different approach to managing CO<sub>2</sub> emissions from aviation in the future. The DfT maintained this approach in its updated assessment.
- 6.11.5 Under the AC's 'carbon-capped' scenario, the 'gross' CO<sub>2</sub> emissions from flights departing UK airports are limited to the CCC's planning assumption of 37.5 MtCO<sub>2</sub> in 2050, and there is no trading of aviation emissions either within the UK economy or internationally.
- 6.11.6 In contrast, under the AC's 'carbon-traded' scenario, there are measures in place which ensure that any increase in CO<sub>2</sub> emissions from flights departing UK airports as a result of airport expansion would not lead to an increase in CO<sub>2</sub> emissions at the international level. In particular, both with and without expansion, it was assumed that the CO<sub>2</sub> emissions from flights departing UK airports are traded at the European level until 2030 and then as part of a global carbon market.
- 6.11.7 The assessment shows that ATMs are by far the biggest source of emissions. Although domestic (intra-UK) emissions are included within the UK's carbon budgets, international ATMs are not. However, all of the Commission's forecasts incorporated measures to ensure that carbon dioxide emitted by UK flights and ground movements does not lead to increased emissions overall either at international level (in the carbon-traded forecast) or within the UK economy (in the carbon-capped forecast). The AC and the DfT concluded that, therefore, the increases in emissions from flights are not additional and are not monetised in the AC's or DfT's economic analysis of carbon impacts.

- 6.11.8 The AC's *Final Report* and DfT's updated forecasts make use of a number of assumptions about measures which may result in reduced carbon emissions, and these are built into both the do minimum and do something forecasts<sup>99 100</sup>. These include future changes to aircraft fleets to include a shift to larger aircraft, resulting in fewer ATMs, the introduction of more efficient aircraft, as well as reductions in emissions from airport operations and passenger surface access by rail due to on-going decarbonisation of the grid, and reduced emissions from passenger surface access due to increasing vehicle efficiency.
- 6.11.9 Some of these changes will be brought about through international agreements such as the ICAO GMBM or national legislation. Others will happen as a result of market forces, for example increasing fuel energy costs favouring more efficient aircraft, vehicles and buildings.
- 6.11.10 The emissions assessment carried out by the AC and updated by the DfT is considered to be broadly robust with the majority of the major emissions sources considered. Emissions related to freight operations at the airport, either directly related to airport operations, or as a result of secondary development, were not originally estimated but are considered likely to be small but significant, and further work is required by an applicant during the Detailed Scheme Design stage to quantify and model these under the demand forecasts in a similar manner.
- 6.11.11 The assessment undertaken is based on CO<sub>2</sub> emissions only (construction-related emissions are measured in terms of CO<sub>2</sub> equivalence, CO<sub>2e</sub>). There are likely to be highly significant climate change impacts associated with non-CO<sub>2</sub> emissions from aviation, which could be of a similar magnitude to the CO<sub>2</sub> emissions themselves, but which cannot be readily quantified due to the level of scientific uncertainty and have therefore not been assessed<sup>101,102</sup>. There are also non-CO<sub>2</sub> emissions associated with the operation of the airport infrastructure, such as from refrigerant leaks and organic waste arisings, however, evidence suggests that these are minor and not likely to be material.
- 6.11.12 In addition, the Ecosystem Services Assessment undertaken on behalf of the AC<sup>103</sup> identifies the importance of ecosystems in relation to climate regulation, providing a carbon store, for instance in woodland and undisturbed soils, and loss of actively growing vegetation and its ability to sequester carbon emissions. However, this has not been quantified in the assessment due to lack of robust data. It is recommended that this be assessed by an applicant during the detailed scheme design stage.
- 6.11.13 The emissions calculated by the DfT are summarised in the Table 6.4.

**Table 6.4: Summary of Results of DfT Assessment of Emissions (expressed as Change in MtCO<sub>2</sub> over the Appraisal Period) for each scheme under central demand forecast for both Carbon-Capped (CC) and Carbon-Traded (CT) scenarios<sup>104</sup>.**

Area of Emissions	LGW-2R		LHR-ENR		LHR-NWR	
	CT	CC	CT	CC	CT	CC
Impacts on						
Passenger and staff surface access	9.7	9.7	8.1	8.1	9.5	9.5

<sup>99</sup> Airports Commission, 2015. *Final Report*, pp. 203 - 204. [online] Accessed 04/01/2016.

<sup>100</sup> Department for Transport, 2017. *UK Aviation Forecasts*

<sup>101</sup> Department for Transport, 2015. TAG Unit A5.2, *Aviation Appraisal*. [online] Accessed 06/01/2017.

<sup>102</sup> Committee on Climate Change. 2009. *Meeting the UK aviation target – options for reducing emissions to 2050*. Chapter 6. Non-CO<sub>2</sub> Effects of Aviation. [online] Accessed 06/01/2016.

<sup>103</sup> Jacobs, 2014, 7. *Biodiversity: Ecosystem Services*. [online] Accessed 06/01/2017.

<sup>104</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report*

Area of Emissions	LGW-2R		LHR-ENR		LHR-NWR	
Airport operations (energy and fuel use)	1.2	1.2	2.2	2.2	2.7	2.7
Construction of airport facilities and surface access infrastructure*	3.9	3.9	10.1	10.1	11.3	11.3
<b>Total</b>	<b>14.9</b>	<b>14.9</b>	<b>20.3</b>	<b>20.3</b>	<b>23.6</b>	<b>23.6</b>
Air travel at the expanded airport (not included in the monetised assessment)	185.7	177.3	246.4	235.8	303.6	285.0

\* Figures for construction emissions are expressed as carbon equivalent, or MtCO<sub>2</sub>e. All other figures are in terms of carbon, MtCO<sub>2</sub>.

- 6.11.14 All three schemes will result in an absolute increase in carbon emissions over the appraisal period, and are therefore judged to have Significantly Negative effects. From Table 6.4, it is clear that the LGW-2R scheme results in the lowest emissions in absolute terms over the appraisal period under both the carbon-capped and carbon-traded scenarios. Both Heathrow schemes produce relatively higher emissions than LGW-2R, with the LHR-NWR producing the greatest emissions due to an overall larger number of passengers and a bigger construction programme. The scheme would also have a higher number of ATMs, of which a greater proportion is likely to be long-haul.
- 6.11.15 Overall the LGW-2R scheme is judged to perform best on the objective of minimising carbon emissions in airport runway construction and operation, even allowing for its higher impact in terms of increased passenger surface access emissions. Of the two Heathrow schemes, the LHR - ENR performs marginally more strongly, with the LHR - NWR being the least favourable of all the schemes.
- 6.11.16 The AC and DfT use of a number of assumptions about measures which may result in reduced carbon emissions, and these are built into the forecasts.<sup>105</sup> These include:
- That, although passenger numbers are expected to increase over time, emissions from aviation are expected to decrease due to a shift by fleet operators to larger aircraft requiring fewer overall ATMs to deal with the expected increase in passengers leading to a net overall reduction;
  - That emissions from aviation will decrease over time as fleets move to more efficient aircraft;
  - That indirect emissions from airport operations will decrease as the electricity supply is gradually decarbonised;
  - That emissions from passenger and staff surface access by road will decrease as a result of increasing vehicle efficiency and greater use of low emissions vehicles; and

<sup>105</sup> Airports Commission, 2015. *Final Report*, p. 203 & 204. [\[online\]](#) Accessed 04/01/2016

→ That emissions from passenger and staff surface access by rail will decrease due to the increasing electrification of rail and the expected parallel decarbonisation of the electricity grid.

- 6.11.17 Some of these changes will be forced by legislation, for example the EU Emissions Trading System, which covers emissions reductions from intra-EU aviation, electricity generation and large combustion plant, or through voluntary emissions trading systems such as the International Civil Aviation Organisation (ICAO) Global Market-Based Measure (GMBM) agreed in 2016. Others will happen as a result of market forces, for example increasing fuel energy costs favouring more efficient aircraft, vehicles and buildings.
- 6.11.18 There are a wide range of mitigation options available to all three scheme promoters, and each has addressed the potential measures that could be undertaken in reports included in support of their submissions<sup>106,107,108</sup>. Jacobs have also addressed potential mitigation methods in the Carbon: Assessment Report<sup>109</sup>, although these are generic, rather than the specific measures identified by the promoters.
- 6.11.19 It is important for the selected scheme, an appropriate mitigation strategy is developed during the detailed design stage and mandated through the planning process, together with an emissions monitoring programme to ensure that both the measures identified are implemented, and also that the operation is continually optimised to minimise future emissions throughout its life.

## HIGH DEMAND SENSITIVITY

- 6.11.20 In addition to the carbon impacts under the DfT's central demand scenario, a sensitivity test is included in the carbon annex presenting analysis of the impacts under the high demand scenario. This is to demonstrate what the impacts of expansion might be under a 'worst case scenario' in terms of the possible global economic scenarios considered by the DfT and to test whether they are compatible with the UK's climate change obligations.
- 6.11.21 The analysis concludes that, in the carbon-capped policy scenario, even under DfT's high demand scenario, the UK could meet its carbon obligations under each of the expansion options through a combination of mitigation measures, carbon prices and specific abatement measures
- 6.11.22 The analysis also concludes that, under the carbon-traded scenario, UK aviation emissions could continue to grow unconstrained, provided that compensatory reductions are made elsewhere in the global economy.

<sup>106</sup> RSK Environment, 2014. *A Second Runway for Gatwick*, Appendix A11, Carbon. [\[online\]](#) Accessed 04/01/2016

<sup>107</sup> AMEC Environment & Infrastructure UK Limited, 2014. *Heathrow's North-West Runway-Carbon Footprint Assessment*. [\[online\]](#) Accessed 06/01/2016.

<sup>108</sup> URS, 2014. *Heathrow Expansion, Stage 2 Submission*, Attachment 5-1.

<sup>109</sup> Jacobs, 2014. *Module 8. Carbon: Assessment*. [\[online\]](#) Accessed 04/01/2016

## 6.12 RESOURCES & WASTE

### AoS Objective 15: To minimise consumption of natural, particularly virgin non-renewable, resources

- 6.12.1 The consumption of materials during construction and operation (resources comprising goods, products and componentry) typically requires the extraction – at least in part – of virgin, non-renewable resources.
- 6.12.2 Environmental, social and economic impacts arise (and opportunities exist) across the lifecycle of these materials from the point they are mined, extracted or harvested in their virgin state, through any subsequent processing, manufacture, fabrication, transportation, installation, use, maintenance and end of useful life disposal. Examples of adverse impacts include:
- Consumption of non-renewable resources
  - Limiting availability of resources to local and regional projects
  - Degradation / depletion of the natural environment
  - Generation of waste and subsequent impacts on landfill
  - Greenhouse gas emissions and water scarcity (climate change)
  - Effects on labour, including standards; and
  - Effects on communities.
- 6.12.3 Consumption of construction materials needs to be managed carefully throughout the planning, design, procurement, construction and operational phases of a scheme, to ensure associated environmental, social and economic impacts are eliminated or minimised as far as reasonably practicable.
- 6.12.4 As part of the core works, the LHR-NWR promoter has confirmed that works will involve the demolition and re-provisioning of the Lakeside Energy from Waste (EfW) Plant. The re-provisioning of this sizeable building, associated plant and supporting infrastructure would require significant consumption of materials in addition to the consumption required for the other aspects of the LHR-NWR scheme.
- 6.12.5 There is currently no data or information on the likely volume, type or breadth of materials required to deliver the construction and operation of LGW-2R, LHR-ENR or (including any re-provisioning requirements) LHR-NWR. It is therefore not possible to differentiate between the relative potential performance of each proposed scheme at this stage.
- 6.12.6 Due to the scale of the infrastructure proposed, the anticipated effects of material consumption are assessed to be significant negative for LGW-2R, LHR-ENR and LHR-NWR.

### AoS Objective 16: To minimise the generation of waste in accordance with the principles of the Resource Efficiency Hierarchy

- 6.12.7 The disposal of waste to landfill during construction and operation has a number of adverse impacts, the principal examples being:
- Landfill taxation (£costs)
  - Reduction of local and regional landfill capacity
  - Visual, noise, health and other nuisance impacts on local communities
  - Environmental degradation / pollution; and
  - Greenhouse gas emissions.

- 6.12.8 Forecast data on waste arisings from the construction phase have been provided only by LGW-2R, where a total of 1.6 M tonnes of arisings have been predicted. LHR-ENR and LHR-NWR have provided no comparable forecast; however, given the anticipated scale of such infrastructure projects, waste arisings from the excavation, construction and demolition works associated with these latter schemes has the potential to be in the order of magnitude of 'millions of tonnes'.
- 6.12.9 Operational waste forecasts from passengers are presented in detail across a range of scenarios and years between 2030 and 2050 for LGW-2R, LHR-ENR and LHR-NWR. The effects of implementing waste reduction activities at site have also been presented.
- 6.12.10 No estimate has been made of the quantities of waste that would arise from the proposed demolition of the Lakeside EfW Plant (which is unique to the LHR-NWR scheme). The demolition of the Lakeside EfW Plant also has the potential to cause issues for waste management because increased transportation costs and alternative routing for some waste authorities – both within the London region and further afield - would be required if alternative facilities are used. Burdens on alternative waste management / recycling infrastructure might also be realised, in addition to indirect negative impacts on local traffic conditions.
- 6.12.11 The demolition of the EfW Plant would likely exacerbate the temporary and permanent impacts associated with the LHR-NWR scheme.
- 6.12.12 Due to scale of the infrastructure proposed, the anticipated effects of waste arisings are assessed to be significant negative for LGW-2R, LHR-ENR and LHR-NWR.

## 6.13 HISTORIC ENVIRONMENT

### Objective 17: Conserve and where appropriate enhance heritage assets and the wider historic environment including buildings, structures, landscapes, townscapes and archaeological remains

- 6.13.1 For this topic the impact of the schemes on nationally important heritage assets with statutory designation known to be present within three study areas was considered: the Land Take Study Area (footprint); Intermediate Study Area (within 300 m of the outer limit of the land take) , and Outer Study Area (300 m-2 km) was considered. In addition a World Heritage Site (WHS) (Kew Gardens) was considered (although this lies just outside of the Outer Study Area). The assessment also considered non-designated assets within the land-take and Intermediate Study Area of the scheme airport boundary.
- 6.13.2 Of the nationally important and designated heritage assets four Scheduled Monuments 181 Listed Buildings seven Conservation Areas recorded related to the LGW-2R. Three Scheduled Monuments, 190 Listed Buildings one Registered Park and Garden and 11 Conservation Areas relate to LHR-ENR. The remaining four Scheduled Monuments, 225 Listed Buildings and 12 Conservation Areas relate to LHR-NWR.
- 6.13.3 At the strategic level the assessment of the significance of individual heritage assets has not been undertaken but should be undertaken to support the EIA- Generally, sites can be ascribed heritage values under the NPPF (i.e. archaeological, artistic, architectural and historic).
- 6.13.4 The assessment identified a number of key impacts which will affect individual heritage assets and their settings. It determined that the magnitude of the impacts and consequently the significance of the effect would differ dependent upon the location of the heritage asset and the distance of the assets from the land take. Although the nature and magnitude of the key impacts would be consistent between the three schemes, LGW-2R has the lowest number of negative impacts and LHR-NWR the highest. The key impacts identified will be as a direct result of the schemes and fall into two categories – construction and operation.

- 6.13.5 The schemes can contribute to a minor extent to the conservation or enhancement of the historic environment including landscapes, townscapes, buildings, structures and archaeological remains. Following more detailed mitigation proposals positive impacts could be realised through addressing heritage at risk (including those assets that become at risk as a result of the scheme), enhancement to conservation areas, improving the setting of heritage assets, mitigating noise impacts, community engagement, improving access to/or interpretation of assets and understanding and appreciation of assets. In addition adopting the use of green space in areas of high or known archaeological potential will also contribute to enhancement.
- 6.13.6 Although the assessed significance of the effect on the designated assets does not vary by scheme, the number of heritage assets and their settings affected does vary. Based on a quantitative assessment of the designated assets LGW-2R has the lowest number of negative impacts (192) and LHR-NWR (including surface access corridors) the highest (247).
- 6.13.7 The assessment results for LGW-2R identified potential for (22) negative effects on designated assets within the Land Take Study Area (including surface access corridors). The setting of a further ten designated heritage assets could be affected within the Intermediate Study Area for the LGW-2R scheme and within the Outer Study Area the setting of a further 160 designated assets could potentially be affected at LGW-2R. In total there will be negative effects on 192 designated heritage assets and their settings as a result of this scheme.
- 6.13.8 The assessment results for LHR-ENR identified the lowest (8) potential for negative effects on designated assets within the Land Take Study Area (including surface access corridors). The setting of a further 30 designated heritage assets could be affected within the Intermediate Study Area for the LHR-ENR scheme and within the Outer Study Area the setting of a further 168 designated assets could potentially be affected. In total there will be negative effects on 206 designated heritage assets and their settings which is higher than LGW-2R but lower than LHR-NWR.
- 6.13.9 The assessment results for LHR-NWR identified the highest (27) potential for negative effects on designated assets within the Land Take Study Area (including surface access corridors). The setting of a further 54 designated heritage assets could be affected within the Intermediate Study Area for the scheme and within the Outer Study Area the setting of a further 166 designated assets could potentially be affected. In total there will be negative effects on 247 designated heritage assets and their settings which is higher than LGW-2R and LHR-ENR.
- 6.13.10 The loss of non-designated assets and potential unrecorded archaeological remains (numbers unknown) within the Land Take Study Area for all three schemes is also likely. 35 non-designated assets and 12 archaeological notification areas are present at LGW-2R. 74 non-designated heritage assets are present at LHR-ENR and 167 at LHR-NWR.
- 6.13.11 It should be noted that the number of sites affected alone does not necessarily reflect the relative performance of schemes against each other as information on significance of the asset and characteristics of effect are not known at this stage.

## 6.14 LANDSCAPE

### **Objective 18: To promote the protection and improvement of landscapes, townscapes, waterscapes and the visual resource including areas of tranquillity and dark skies**

- 6.14.1 As with any major infrastructure project, effects on landscape character (including historic landscape) and visual amenity will arise during construction and operation for all three schemes. The significance of the effects will depend on the scale and nature of the impacts associated with each scheme in relation to the sensitivity of the receiving landscape and visual receptor and their proximity to the scheme. Not all impacts can be effectively mitigated due to the scale and nature of the proposed development.

- 6.14.2 On all sites, the proposed airport expansion would be seen in the context of existing airport facilities. Development, which is likely to take place in areas around Gatwick and Heathrow regardless of the runway expansion proposals, will have direct and indirect effects on the character of the surrounding landscape and visual amenity.
- 6.14.3 Land take for each scheme will be large and will inevitably have an adverse impact on the character of the landscape surrounding each site. Although already influenced by the existing facilities, the landscape around Heathrow Airport and Gatwick Airport is mixed comprising areas of urban development and rural landscape, some of which have high sensitivity.
- 6.14.4 There would be no direct effects on landscape character within nationally designated landscapes; indirect effects would arise in areas with intervisibility of the scheme and changes in current flight patterns. Potential effects cannot be assessed until further information is available regarding the direction / height / number of flights over the AONBs.
- 6.14.5 The LGW-2R scheme will involve the loss of ancient woodland, and with mitigation proposed by the promoter, would have significant negative effects on the West Sussex LW8 Northern Vales Landscape Character Area (LCA) during construction and operation.
- 6.14.6 LHR-ENR and LHR-NWR schemes would both involve partial loss of the Colne Valley Regional Park resulting in a moderate adverse impact during construction. With mitigation, LHR-ENR would have a negative effect at operation and LHR-NWR would have a significant moderate adverse effect. Both schemes would have a significant major adverse impact on the Hillingdon Lower Colne Floodplain LCA which could not be mitigated effectively in the longer term. LHR-ENR would have negative effects on landscape and townscape character areas including the Hillingdon Historic Core.
- 6.14.7 At operation the spatial extent and significance of effects would be greater from LHR-NWR than from LHR-ENR, which would have significant negative effects on the Hillingdon Historic Core.
- 6.14.8 For LGW-2R, the most significant views towards the schemes would be from residential and recreational receptors to the immediate south, west and east including Ifieldwood, B2036 and Radford Road properties, Crawley, PRoW and the Tandridge Border Path. Moderate to major adverse visual impacts would arise at all locations during construction. Moderate adverse impacts would continue at operation in relation to receptors with the highest sensitivity, notably the Surrey Hills AONB, High Weald AONB and Tandridge Border Path recreational trail.
- 6.14.9 LHR-ENR would have a negative effect on views from properties in Stanwell, Stanwell Moor and long distance views from a local Area of Landscape Importance. Moderate adverse and significant effects on views would arise at properties on the edge of settlements at Colnbrook, Horton and Longford, as well as the Colne Valley Way recreational route.
- 6.14.10 LHR-NWR would have a moderate adverse and significant negative effect on views from Harmondsworth and Sipson villages and Harmondsworth Moor.
- 6.14.11 For all three schemes there is the potential for some areas to experience a reduction in tranquillity due to the increased area of flight paths associated with the new runway. In the absence of proposed definitive flight routes, potential impacts on tranquillity, ambient noise and views from increased aircraft activity associated with LGW-2R cannot be assessed with accuracy in relation to the Surrey Hills AONB, High Weald AONB or Kent Downs AONB. Similarly, potential effects on the Chilterns AONB from LHR – ENR and LHR-NWR cannot be assessed at this stage. It is considered likely that adverse effects from increased overflying would be greater from LGW-2R due to the extent and closer proximity of the surrounding AONBs compared to the impact of the LHR – ENR and LHR-NWR schemes on the Chilterns AONB.

- 6.14.12 There is also the potential for increased light levels but this is unlikely to alter the results of the Campaign for the Protection of Rural England (CPRE) Dark Skies mapping given the existing conditions. Potential effects have been assessed as negative for all three schemes.
- 6.14.13 Landscape mitigation and enhancement measures proposed by each scheme promoter have been identified and taken into account in the scheme's assessment. Although the proposed measures would reduce potential landscape and visual impacts, further mitigation and conclusions about the most appropriate design for each site should be developed following detailed landscape and visual impact assessment. At that stage the landscape mitigation would be designed to achieve multiple objectives, including biodiversity, protection of the setting of heritage assets, and to contribute positively to the wider green infrastructure.

## 6.15 CUMULATIVE EFFECTS

- 6.15.1 As described in Section 3, cumulative effects arise, for instance, where several developments each have insignificant effects but together have a significant effect, or where several individual effects of the plan (e.g. noise, dust and visual) have a combined effect<sup>110</sup>. In the context of AoS, this is also taken to include PPPs as well as major projects. A review of PPPs and major infrastructure projects was undertaken and potential for cumulative effects identified. This is presented in Table 6.5 below. Potential cumulative effects have been included within the assessments described above and in the topic based assessments in Appendix A-
- 6.15.2 It should be noted that at the strategic level, this list is not exhaustive and cumulative effects arising from individual projects and plans should be revisited as part of a project level assessment.

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<sup>110</sup> ODPM, 2005, *A Practical Guide to the Strategic Environmental Assessment Directive*, the 'Practical Guide', Appendix 8.

Table 6.5: Potential Cumulative Effects of Schemes for the NPS

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
Policy	National Networks NPS (2014)	The NPS sets out the need for, and Government's policies to deliver, development of NSIPs on the national road and rail networks and strategic railfreight interchanges in England. <sup>111</sup>	<p>Surface access is a key consideration in supporting aviation capacity and has potential for cumulative effects. Development of surface access systems associated with the airport expansion schemes will be designed to maximise and support the number of passengers accessing the airport. In addition to the development of surface access improvements associated with the airport expansion schemes, the Government has identified a critical need to improve the national network to address road congestion and crowding on the railways<sup>112</sup>. Forecast figures from the National Transport Model for all England roads displays that in general, pressure is likely to be greatest in and around areas of high population density and along key inter-urban corridors. This indicates that Strategic Road Networks around London are expected to experience congestion pressures, suggesting development in this area will be brought forward. The Government has also identified crowding on London and South East rail services during peak times. This drive for development, particularly around London, could result in a number of transport infrastructure projects having cumulative effects.</p> <p>The National Networks NPS supports both development of major rail infrastructure such as Thameslink, Crossrail and the Great Western Electrification Programme<sup>113</sup> and also road enhancements, and would also support the development of scheme specific enhancements such as Southern Rail Access (Heathrow), or improvements to the rail network between Gatwick and London. Wider development of National Networks not associated with the listed major infrastructure schemes may also cause cumulative effects. For example, these effects could result in an increase in environmental and socio economic effects on people and communities, including from air quality, noise and inconvenience from an increase in traffic congestion during the overlapping construction phase of these major infrastructure projects.</p> <p>The National Networks AoS<sup>114</sup> recognises that some developments will have adverse local impacts on noise, emissions, landscape / visual amenity, loss of greenfield/ agricultural land, biodiversity, cultural heritage and water resources.</p> <p>Generic impacts associated with the surface access requirements for each scheme which comprise changes to the trunk road network and rail improvements are considered within the National Networks AoS and more detailed impacts are covered within this assessment.</p> <p>Cumulative effects may also arise in conjunction with national networks schemes not attributable to airport schemes in the South East. For example from major rail and rail investment projects funded by central</p>

<sup>111</sup> Department for Transport, 2014. *National Policy Statement for National Networks*, Section 1.1. [\[online\]](#) Accessed 06/01/2017.

<sup>112</sup> Department for Transport, 2014. *National Policy Statement for National Networks*. [\[online\]](#) Accessed 06/01/2017

<sup>113</sup> HM Treasury, 2013. *Investing in Britain's future*, Figure 1a, Pp. 12. [\[online\]](#) Accessed 21/12/2015.

<sup>114</sup> Ramboll, 2014. *The National Policy Statement for National Networks Appraisal of Sustainability*.

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
			<p>government, including those listed by HM Treasury as part of its road and rail investment programmes (2013)<sup>115</sup>. For example, there are road improvements schemes proposed to the M23, to the A27, south of Gatwick, and to various sections of the M25.</p> <p>It is also acknowledged that there may be further cumulative effects from local surface access improvements (to the road and rail network) associated with development which is not considered to be a national network improvements, and is being progressed by local authorities.</p>
Policy	Waste Water NPS (2012)	<p>The NPS sets out Government policy for the provision of major waste water infrastructure.</p> <p>It also provides information on two potential NSIPs. These are: a sewage treatment works scheme at Deephams in North East London and a waste water collection, storage and transfer tunnel (the Thames Tunnel).<sup>116</sup></p>	<p>The Planning Act 2008 sets the threshold for nationally significant waste water infrastructure as the construction of, or alteration to, a waste water treatment plant with a capacity exceeding a population equivalent of 500,000.</p> <p>Two NSIP have been identified in the NPS for Waste Water based on their strategic need. These are the improvements to the sewage treatment works at Deephams and a waste water collection, storage and transfer tunnel (the Thames Tunnel), both within London. Deephams Sewage Works is located in North London, at Edmonton, approximately 30km from the proposed Heathrow schemes. Construction of Deephams Sewage Works will take place between July 2015 and 2018<sup>117</sup>. The western extent of the Thames Tideway Tunnel project is at Acton Storm Tanks, in Ealing approximately 11km from the proposed Heathrow scheme. Construction of Thames Tideway Tunnel will take place between 2016 and 2023<sup>118</sup>, and work at Acton Storm Tanks would be between 2018 and 2021. These waste water treatment projects are relatively geographically remote from any construction activities at the closest expansion schemes at Heathrow, and therefore noise, air quality and traffic effects are not anticipated. In addition, the construction phases for these projects are unlikely to overlap significantly with construction of airport expansion schemes.</p> <p>As urban areas continue to grow and new developments are established with increasing population, there will be an increased demand for waste water infrastructure. This is essential for public health and to ensure that standards for water quality set out in existing and new legislation are met. The aviation capacity schemes discharge to local watercourses with potential effects on water quality.</p>
Policy	High Speed	High Speed Two (HS2) is	The construction of the HS2 development combined with the aviation capacity schemes may result in

<sup>115</sup> HM Treasury, 2013. *Investing in Britain's future*, Figure 1a, Pp. 12. [\[online\]](#) Accessed 21/12/2015.

<sup>116</sup> Defra, 2012. *National Policy Statement for Waste Water: A framework document for planning decisions on nationally significant waste water infrastructure*, Section 1. [\[online\]](#) Accessed 06/01/2016.

<sup>117</sup> Thames Water, 2016. *Questions about the upgrade*.

<sup>118</sup> Thames Tideway, 2016. *Timeline*. [\[online\]](#) Accessed 04/01/2015.

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
	High Speed Rail (London - West Midlands) Act 2017	<p>being delivered to provide Britain's railways with new capacity, better connectivity and quicker journeys. Phase One of HS2, links London and the West Midlands.</p> <p>Phase Two will connect Birmingham to Leeds and Manchester.</p>	<p>cumulative effects. Although the project is pending consent, HS2 is scheduled for construction between 2017 and 2033<sup>119</sup>. Potential cumulative effects during construction include air quality, noise and congestion from construction activities, plant and traffic<sup>120</sup>. Both developments will contribute to additional greenhouse gas emissions during construction.</p> <p>Significant effects of HS2 on local air quality within London have been identified<sup>121</sup>, particularly as a result of NO<sub>2</sub> concentrations from road traffic emission, which could cause localised cumulative air quality impact with the aviation capacity schemes. There would be positive cumulative effects through improved and increased travel capacity and connectivity. There may also be adverse effects associated with the changes to road travel behaviours on some routes.</p> <p>The section of HS2 which is located in closest proximity to the Heathrow expansion schemes will be located within a bored tunnel, the closest overland section of HS2 is located approximately 11km from the Heathrow expansion schemes. No cumulative operational effects arising from land take on human and environmental receptors within London are anticipated. Landscape and heritage assets which are located between HS2, Heathrow and its associated surface access improvements may be subject to cumulative effects. These major infrastructure projects are likely to have positive effects on the economy through creating employment opportunities and will potentially generate economic stimulus for other development<sup>122</sup>. Both the HS2 and the aviation capacity scheme will increase pressure on material resources and waste disposal, particularly in and around London.</p>
Policy	Crossrail	<p>Crossrail is a set of improvements to cross London rail infrastructure which are designed to support London's economic growth.</p> <p>Crossrail was adopted by the government as an Act of Parliament, the</p>	<p>Crossrail's aims for improving urban transportation<sup>123</sup> partly coincide with those of the aviation capacity scheme, therefore, a cumulative improvement to transport connectivity and travel times is possible. The closest overland sections of Crossrail are along the existing Great Western Main Line, and will involve a range of improvements, including to existing bridges, stations and electrification. The scheme will also involve an increase in services along an existing section of tunnel linking the main line to Heathrow and central London. The works are scheduled to take place up until 2017<sup>124</sup>. The works will be completed prior to any construction of the expansion schemes, so no significant cumulative effects during construction are anticipated.</p> <p>During operation, the Crossrail project and an airport expansion scheme will result in significant beneficial</p>

<sup>119</sup> HM Treasury, 2015. *National Infrastructure Pipeline*. [online] Accessed 23/12/2015.

<sup>120</sup> Golder Associates, 2014. *HS2 Independent Assessor report*. [online] Accessed 23/12/2015.

<sup>121</sup> HS2, 2013. *London-West Midlands Environmental Statement Non-technical summary*. [online] Accessed 06/01/2017.

<sup>122</sup> Golder Associates, 2014. *HS2 Independent Assessor report*. [online] Accessed 06/01/2017.

<sup>123</sup> Crossrail 2015, *Crossrail Sustainability Report 2015*. [online] Accessed 06/01/2017.

<sup>124</sup> Crossrail, 2015. *Crossrail Western Section – Paddington to Heathrow and Reading*. [online] Accessed 04/01/2015.

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
		<p>Crossrail Act 2008.</p> <p>It is intended that Crossrail will increase London's rail transport capacity by 10%, make journey times shorter and bring an extra 1.5 million people within 45 minutes of London's business centres.</p> <p>Crossrail connects Heathrow and Reading west of London, with Shenfield and Abbey Wood, east of London.</p>	<p>effects on the local, regional and national economy due to direct investment in necessary supply chains required to run and operate the infrastructure networks, and the associated job creation both from direct employees and from improvements to transport economic efficiency benefitting businesses and people using these services. Further consideration of the potential environmental effects is recommended when more information about impacts from project design is available. The topics for consideration would be expected to include communities, biodiversity, soils, water, noise, air quality and landscape and visual impacts.</p>

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
Plans	Local Development Plans	<p>Local planning authorities must prepare a local plan which sets planning policies in a local authority area. The plans also provide the framework for future development of land.</p> <p>For the short listed schemes, local development plans for the following local authorities should be considered. These local authorities areas are within the areas which may be subject to disturbance from noise.</p> <p>Crawley District;  Horsham District;  Reigate and Banstead District;  Surrey County;  Mole Valley District;  Tandridge District;  West Sussex County;</p>	<p>The local authorities located in the vicinity of the expansion schemes have various plans for residential, commercial or infrastructure development. Cumulative effects with planned development can be anticipated, particularly where proposed new development is located in close proximity to the expansions schemes and the associated surface access improvements. A detailed consideration of the potential for cumulative effects arising would need to be undertaken as part of an EIA- The cumulative effects which are described below reflect the general strategic issues associated with major development and the airport expansion schemes. The significance of any cumulative effects are expected to vary considerably depending on the nature of development:</p> <ul style="list-style-type: none"> <li>→ Beneficial effects on the local and national economy due to improved access of proposed employment allocations to international markets, which will be enabled through development of airport expansion schemes;</li> <li>→ Adverse and beneficial effects on services, facilities and infrastructure, affecting communities which are located in close proximity to airport expansion schemes. Beneficial effects may arise from an increased provision of services and facilities, and adverse effects may arise due loss of services, facilities and infrastructure;</li> <li>→ Development of the airport expansion schemes and allocated sites will reduce the available land within local plans and the London Plan for development for other uses<sup>125</sup>, or to be safeguarded for environmental reasons. Many of the local authorities located within Greater London, particularly around Heathrow are highly constrained in terms of the availability of land, as a consequence local authorities may find it increasingly difficult to identify suitable land for development<sup>126</sup>.</li> <li>→ Loss of greenfield land and associated soils, including agricultural land.</li> <li>→ Increase in noise associated with concurrent construction activities adversely affecting humans and wildlife;</li> <li>→ Increase in operational noise from residential, industrial, commercial or infrastructure development concurrently with any increases in noise associated with the operational airport, including from aircraft.</li> <li>→ Adverse effects on tranquillity, particularly in areas where the future tranquillity is sensitive to further development.</li> <li>→ Adverse air quality effects associated with traffic generated by or associated with proposed new</li> </ul>

<sup>125</sup> Jacobs, 2014,.10, *Place: Baseline*. [\[online\]](#) Accessed 06/01/2016.

<sup>126</sup> Jacobs, 2014,.10, *Place: Baseline*. [\[online\]](#) Accessed 06/01/2016.

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
		Runnymede District Slough Borough ; South Bucks District ; Spelthorne Borough ; The London Borough of Ealing ; The London Borough of Hammersmith and Fulham The London Borough of Hounslow; The London Borough of Hillingdon; The London Borough of Richmond upon Thames ; London Borough of Westminster: and The Royal Borough of Windsor and Maidenhead .	development, and the airport expansion; → Direct and indirect effects on ecology, including to designated or undesignated sites or to species which are protected or sensitive; → Direct landscape and visual effects (including to townscape and waterscape) where proposed developments are located in close proximity to the expansion schemes and to visually sensitive or protected landscapes; → Direct and indirect adverse effects on designated or undesignated heritage assets, for example due to land take or due to indirect effects on the setting of these assets; → Adverse effects on surface water flooding due to increases in impermeable areas; → Adverse effects on hydrogeology due to contamination of sensitive hydrological features including surface water and groundwater. → Development of minerals safeguarding sites, such as those located around Heathrow, will result in an adverse effect on the future availability of mineral resources, as development of this land will effectively sterilise the resource.

TYPE	NAME	SUMMARY DESCRIPTION	POTENTIAL CUMULATIVE EFFECTS WITH AVIATION CAPACITY NPS
	Local Mineral and Waste Plans	<p>All Planning Authorities are required, by law, to develop plans for mineral and waste provision. The plans also provide the framework for mineral extraction and waste management.</p> <p>For the schemes, plans for the following local authorities areas apply:</p> <p>West Sussex County, Surrey County. London boroughs (as listed above), Buckinghamshire County, Slough Borough, Windsor and Maidenhead Borough.</p>	<ul style="list-style-type: none"> <li>→ Adverse effects on noise and tranquillity, particularly in areas where the future tranquillity is sensitive to further development.</li> <li>→ Adverse air quality effects associated with traffic generated by or associated with mineral extraction or waste management facilities, and the airport expansion;</li> <li>→ Direct and indirect effects on ecology, including to designated or undesignated sites or to species which are protected or sensitive;</li> <li>→ Direct landscape and visual effects (including to townscape and waterscape) where mineral and waste developments are located in close proximity to the expansion schemes and to visually sensitive or protected landscapes;</li> <li>→ Direct and indirect adverse effects on designated or undesignated heritage assets, for example due to land take or due to indirect effects on the setting of these assets;</li> <li>→ Potential to limit restoration of mineral extraction sites as waterbodies due to potential for bird strike.</li> </ul>
Plans	The London Plan and London spatial planning Framework	<p>The London Plan is statutory development plan for the Greater London Area. The London Plan extends to cover the Heathrow expansion schemes, but does not include Gatwick.</p> <p>In addition to the London Plan, the spatial planning framework for London is supported by the Mayor's Transport Strategy, and Economic Development Strategy.</p>	<p>The London Plan sets out various infrastructure improvements which are proposed within Greater London area. Some of the major infrastructure developments which are supported by the London Plan, such as Crossrail, and HS2 are supported by national planning policy.</p> <p>Development of surface access facilities around the expansion scheme will be a key consideration in supporting aviation capacity and has potential for cumulative effects. The surface access schemes will be designed to increase and support the number of passengers accessing the airport. There will be a need to improve the connecting infrastructure in London to the proposed airport expansion.</p> <p>The London Plan and Mayor's Transport Strategy supports the development of major rail infrastructure such as Thameslink, Crossrail and the Lower Thames Crossing. Development of infrastructure within London may cause in an increase in environmental and socio economic effects on people and communities, including from air quality, noise and inconvenience from an increase in traffic congestion during the overlapping construction phase of these major infrastructure projects. These developments will have adverse local impacts on noise, emissions, landscape / visual amenity, biodiversity, cultural heritage and water resources. The potential for significant cumulative effects at a local level should be considered in more detail in an EIA-</p>

# 7 ASSESSMENT OF PREFERRED SCHEME: HEATHROW NORTH WEST RUNWAY

## 7.1 INTRODUCTION

7.1.1 This section assesses the Airports NPS in addition to the preferred scheme for Airport expansion. It then proposes a number of mitigation and monitoring measures for significant effects.

## 7.2 HOW THE AOS WAS TAKEN INTO ACCOUNT IN DEVELOPING THE NPS

7.2.1 The work undertaken by the AC including the Sustainability Appraisal for each scheme and the recommended mitigation formed the basis for the development of the NPS. The NPS was then developed alongside the AoS in relation to key areas set out in Table 7.1 below.

7.2.2 The assessment is an iterative process where drafts of the AoS have informed the NPS and as the NPS has developed it has informed the AoS assessment. The Steering Group have also provided feedback which has been taken into account throughout the development of the AoS. This has also informed the NPS.

**Table 7.1: Relationship between the Airports NPS and the AoS**

AoS Process	NPS
Scoping: Identification of plans, policies and programmes (PPPs) and sustainability issues (summarised in Section 2 of the AoS).	Introductory sections of sustainability topics in Chapter 5 of the Airports NPS set out key sustainability issues and relationship with policy and/or key environmental legislation.
Development of the policy and reasonable alternatives (summarised in Section 5 of the AoS).	Chapter 2 of the AirportsNPS sets out the need for the policy and Chapter 3 sets out the justification for the preferred scheme.
Evaluation of the likely effects of the reasonable alternatives and preferred scheme (summarised in Sections 6 and 7 of the AoS).	Chapter 3 of the NPS summarises the environmental, health and community impacts of alternative schemes. Chapter 5 of the AirportsNPS describes the main impacts of the policy.
Consideration of mitigating negative effects and maximising positive effects (Section 7 of the AoS)	Chapter 5 of the Airports NPS sets out policy relating to the applicant's assessment and mitigation considered.

7.2.3 The Airports NPS sets out:

- The Government's policy on the need for new airport capacity in the South East of England;
- The Government's preferred location and scheme to deliver new capacity; and
- Particular considerations relevant to a development consent application to which the Airports NPS relates.

7.2.4 The Government's policy on the need for new capacity is set out in Section 2 of the NPS and preferred scheme is set out in Section 3 of the NPS. Section 5 of the NPS sets out general

impacts and requirements including mitigation measures, many of which have been identified through the AoS process (Table 7-1).

## 7.3 REASONS FOR SELECTION OF THE PREFERRED SCHEME AND REJECTION OF ALTERNATIVES

7.3.1 On 25 October 2016, the Government announced that its preferred scheme to meet the need for new airport capacity in the South East of England was a Northwest Runway at Heathrow Airport. The Government believes that the LHR-NWR scheme, of all the three shortlisted schemes, is the most effective and most appropriate way of meeting the requirement for additional capacity in the South East in a way in which best meets the needs case and maintains the UK's hub status. A range of factors have been taken into account. These are set out in Section 3 of the NPS and summarised below:

- International connectivity and strategic benefits, including freight<sup>127</sup> - Heathrow Airport is best placed to address this need by providing the biggest boost to the UK's international connectivity. Heathrow is one of the world's major hub airports, serving around 180 destinations worldwide, including a diverse network of onward flights across the UK and Europe. Without expansion, the UK's position as a global hub would deteriorate, but this status can be maintained if Heathrow expands. Gatwick would largely remain a point to point airport, attracting very few transfer passengers. Expansion at Heathrow also delivers the greatest benefit to air freight, further facilitated by the existing and proposed airport development of freight facilities accompanying the Northwest Runway scheme.
- Passenger and wider economic benefits<sup>128</sup> - Expansion at Heathrow would increase the availability of services, and increase competition between airlines. This would lower fares that passengers can expect to face relative to no expansion and passenger benefits will be experienced more rapidly once the new capacity is operational, with both Heathrow schemes. Expansion at Heathrow is also expected to result in larger benefits to the wider economy than expansion at Gatwick, including the number of jobs created locally and the increased government revenue that these jobs bring. For example, the Northwest Runway scheme is expected to generate an additional 57,000-114,000 jobs in the local area by 2030, with Heathrow Airport also pledging to provide 5,000 additional apprenticeships by this time. The number of local jobs created at an expanded Heathrow is predicted to be much greater than at Gatwick (up to 21,000 by 2030 and 60,000 by 2050).
- Domestic connectivity– At an expanded Heathrow there would be more additional passengers from outside of London and the South East forecast to make one way international journeys (5.9m at LHR-NWR compared with 4.6m at LHR-ENR and 3.8m at LGW-2R). This means that more passengers from across the UK are likely to benefit from lower fares and access to important international markets from the airport. Heathrow Airport has pledged that expansion could increase domestic routes at Heathrow to 14, compared to the eight routes currently in operation. This compares to 12 domestic routes for Gatwick, compared to the six currently offered.
- Surface access links; Heathrow has good access links to the rest of the UK for passengers and users because of its more accessible location and more varied surface access links. Although Gatwick has access to London via road and rail, its location makes it less convenient for onward travel to the rest of the UK.
- Views of airlines, regional airports and the business community - The benefits of expansion will be delivered only if airlines and the industry choose to use the new capacity, and pay for it via airport charges. Heathrow's scheme has stronger support from the airlines and wider business community.

<sup>127</sup> Airports Commission, 2015. *Final Report*, p. 105. [\[online\]](#) Accessed 06/01/2017.

<sup>128</sup> Airports Commission, 2015 *Final Report*, p. 135. [\[online\]](#) Accessed 06/01/2017.

- Financeability; While the LGW-2R would be significantly cheaper than the two schemes at Heathrow, with the LHR-NWR the most expensive of the three shortlisted schemes, all three are private sector schemes which the Government found to be financeable without Government support. Since then, the Government has conducted further assurance work on the financeability of HAL's scheme and concluded that, so far as can be assessed at this early stage of the process, HAL appears in principle to be able to privately finance expansion without Government support. The level of debt and equity required for the LGW-2R scheme would be significantly lower than for the Heathrow schemes, but the AC noted that the LGW-2R scheme would have comparatively higher demand risk, which is harder for Government to mitigate. Both Heathrow schemes build on a strong track record of proven demand that has proven resistant to economic downturns.
- Deliverability; The three shortlisted schemes involve different levels of delivery risk. The delivery dates for both Heathrow schemes are likely to be more risky than that for Gatwick as they are more complex. The AC worked with the CAA and NATS to review the operational and airspace implications of all three shortlisted schemes. The consensus was that, while managing the expected increase in air traffic safely for any scheme will be challenging, it should nevertheless be achievable given modernisation of airspace in the South East and taking advantage of new technologies – changes which will be necessary with or without expansion.
- Local environmental impacts. Airports can have negative as well as positive impacts, and these must be weighed against the strategic and economic benefits. All three schemes will have significant impacts on the environment and local community; in particular, noise is a significant issue for communities at both Heathrow and Gatwick. Gatwick would have a lower level of adverse effects relating to noise and air quality than either scheme at Heathrow, primarily because of its more rural location and with fewer people impacted by the airport. The Government agrees with the AC's conclusion that *"to make expansion possible... a comprehensive package of accompanying measures [should be recommended to] make the airport's expansion more acceptable to its local community, and to Londoners generally"*. This is expected to include a highly valued scheduled night flight ban of at least six and a half hours between 11pm and 7am (with the exact start and finish times to be determined following consultation), and the offer of a predictable period of respite for local communities.

7.3.2 The Northwest Runway scheme must also be deliverable within legal requirements on air quality and greenhouse gas emissions. The Government agrees with the evidence set out by the AC that expansion at Heathrow is consistent with the UK's climate change obligations. Further information on these impacts is provided in this section of the AoS.

7.3.3 Section 3 of the Draft NPS also concludes that the LHR-ENR has two advantages over the LHR-NWR: lower capital costs (£14.4 bn compared with £17.6 bn) for the extended northern runway scheme; and significantly fewer houses being demolished (242 rather than 783), as well as avoiding impacts on a number of commercial properties.

7.3.4 However, the Government made a preference for the LHR-NWR based on a number of key factors. These comprise:

- Resilience because of the way the three separate runways can operate more flexibly when needed to reduce delays, and the less congested airfield. It delivers greater capacity (estimated on a like for like basis by the AC at 740,000 flights departing and arriving per annum compared to the extended northern runway scheme at 700,000), accordingly higher economic benefits, and a broader route network.
- LHR-NWR would be able to offer greater respite from noise by altering the pattern of arrivals and departures across the runways over the course of the day to give communities breaks from noise.
- Although both schemes are deliverable, LHR-ENR has no direct global precedent. As such, there is greater uncertainty as to what measures may be required to ensure that the airport

can operate safely and what the impact of those measures may be, including the restriction on runway capacity.

## 7.4 SUMMARY OF SIGNIFICANT EFFECTS: PREFERRED SCHEME

### COMMUNITY

- 7.4.1 Within the predicted Heathrow Northwest Runway expansion land take, up to 783 homes are expected to be lost. The majority of this housing loss would be seen in Hillingdon, Hounslow and Slough. Harmondsworth primary school is expected to be lost, along with Harmondsworth Community Hall, Sipson Community Centre, Heathrow Special Needs Centre in Longford, nursery schools in Longford, Harmondsworth and Sipson, the White Horse and Kings Arms pubs in Longford, and a number of recreational facilities and spaces such as Sipson Recreation Ground. Mitigation includes financial compensation and relocation assistance, and re-provision of Harmondsworth primary school and community hall. Although some mitigation is provided in terms of financial compensation and other measures, the NPS is still considered likely to result in a substantial loss of housing and community facilities that cannot be reversed. Furthermore, cumulative effects may be experienced by the community in relation to other infrastructure such as Crossrail. As a result, the overall effects on community viability caused by loss of housing and community facilities as a result of the proposed LHR-NWR scheme are considered to be Significant Negative.
- 7.4.2 Between 300 and 500 additional homes per local authority per year are likely to be required to meet demand under the LHR – NWR scheme. These are likely to give rise to a requirement for additional schools, 2 additional health centres (14 GPs) and 2 primary care centres per local authority to 2030. There is also likely to be a need for additional parks or open spaces. As is indicated, it is anticipated that the scale of housing required will increase pressures on current local authority plans. Overall, impacts on housing demand will be spread across local authorities across London and the South East and is low in comparison to existing planned housing. However, the scale of the change is unlikely to significantly increase the housing pressures across the entire London region. Therefore, the overall effects on community viability caused by increased demand for housing and community facilities as a result of the proposed LHR-NWR scheme are considered to be Negative.
- 7.4.3 In the case of the LHR – NWR scheme, it is estimated that 121,340 people will experience a rise in annual mean NO<sub>2</sub> levels. In terms of noise, the effects of changes in airspace noise exposure on the local population from the LHR-NWR scheme are considered to be predominantly significant negative. There is a predicted increase of 52,900 people affected by noise exceeding 54 dB L<sub>Aeq16 hr</sub> by 2040. Therefore, the indirect effects on community viability as a result of the proposed LHR-NWR are considered to be Significant Negative.
- 7.4.4 In terms of equalities, the loss and relocation of housing and of some community facilities such as a primary school, nurseries and other community facilities could result in additional journey times, which may differentially affect mothers travelling to nurseries with their children, elderly people and their families, and could lead to disruption and additional journey times for those with disabilities.
- 7.4.5 There is a significant BAME community across local wards which may be differentially and disproportionately affected by the Gatwick development, since they are more likely than others to experience barriers to affordable housing, as well as problems of poor quality housing and overcrowding<sup>129</sup>. However, LHR-NWR could also have a positive disproportionate effect on BAME communities within the study area, through the creation of employment opportunities matching the current skills of the population.

<sup>129</sup> London Health Commission.2011. *Fair London Healthy Londoners*.

- 7.4.6 In the LHR-NWR study area the population tends to be younger than regional and national averages. There may, therefore, be differential and disproportionate effects on younger people in the area due to loss and severance impacts in relation to housing and community facilities. Similarly, LHR-NWR may have a differential effect on children and older people, as the impacts of each development would lead to specific areas experiencing changes in noise and air quality.
- 7.4.7 There are relatively high unemployment rates in the area surrounding LHR-NWR. Therefore, development of these schemes presents the possibility of a relatively strong match between the new jobs which could be created and the current skills of the population. Current trends for on airport direct employment, suggest that there is capacity for some of these new jobs to be filled by unemployed people from these areas.

## QUALITY OF LIFE

- 7.4.8 Mixed positive and negative effects are expected, as described below. However, overall, a significant negative effect upon QoL is expected as a consequence of the negative effects described below:
- Disruption to the road network during construction will result in increased congestion during the construction phase;
  - Loss of housing, and displacement and for the remaining residents experiencing the disruption of an extended construction period;
  - Displacement of Harmondsworth Primary School and community facilities, loss of recreation and amenity including the War Memorial Recreation Ground during the construction phase;
  - Increase in the number of sensitive receptors exposed to daytime aircraft noise causing annoyance, with potential for associated health effects;
  - Impaired learning of schoolchildren at risk of exposure to excessive aircraft noise levels;
  - Potential future reductions in population suffering from loss of sleep as a result of exposure to night-time aircraft noise;
  - Several thousand local residents as well as other sensitive receptors being exposed to worsening air quality;
  - Loss of access to the natural environment and recreational areas for local residents during the construction phase although this will improve during operation due to compensation and improvement measures to loss of habitat and recreational areas;
  - Direct loss of and indirect effects on sites of cultural heritage;
  - Increased risk of flooding through loss of floodplain and increase in non-permeable surface; and
  - Additional employment opportunities, both locally and nationally, from airport expansion construction jobs from airport operational jobs and supporting industries.

## ECONOMY

- 7.4.9 The economic benefits which will be realised through airport expansion include both direct effects and indirect effects on the wider economy.

### DIRECT ECONOMIC IMPACTS

- 7.4.10 Direct effects include improved passenger convenience, enhanced availability of flights, reduced airport delays and improved connectivity for businesses which rely on airport transit. For example, expansion has the potential to improve services for passengers, and reverse the long-standing trend of declining domestic links into London, providing new slots for airlines to operate

services to and from areas of currently unserved demand. Expansion may also bolster existing domestic services into London, leading to a rise in the numbers of passengers on, and the frequency of, the most well serviced routes.<sup>130</sup>

7.4.11 The majority of the estimated passenger benefits from expansion are due to a transfer from airlines (producers) to passengers; expansion lowers shadow costs and leads to lower fares for passengers, reducing airline (producer) profits. Passenger benefits include lower fares, frequency benefits and reduced delays, these benefits are expected to total £67.6 bn<sup>131</sup> and include:

- Lower fares: £64.3 bn;
- Frequency benefits: £3.0 bn; and
- Reduced delays: £0.2 bn.

7.4.12 Lower fares will also reduce airline (producer) profits. The costs and benefits associated with transport economic efficiency fall directly on airports, airlines, passengers and affects government revenue and public finances.

- Producer impacts: -£55.0 bn; and
- Government revenue impacts: £3.5 bn.

#### WIDER ECONOMIC IMPACTS

7.4.13 Expansion in airport capacity provides better access to foreign markets, facilitates gains from trade and encourages greater exchange of knowledge and technology, thus improving the overall level of productivity in trade-related sectors of the economy. Three types of productivity-related impacts are estimated:

- Enhanced productivity through increased trade and associated spin-off benefits;
- Change in tax revenue due to relocation of employment to areas with different levels of productivity; and
- Increased business output.

7.4.14 The 'present value' of the beneficial effects on the wider economy and productivity are reported below:

- Additional business output due to improvements in transportation costs, and reduced delays (£1.2 bn);
- Change in tax revenue from redistribution of jobs across areas of the country that have different levels of productivity (£0.5 bn to £1.9 bn);
- The trade related benefits are reported to be in the range £8.8 bn to £16.7 bn, or £130.9 bn depending on the approach taken. This figure is distinct from the total wider economic impacts, as some of the value of these benefits is likely to have been captured within the estimates of other economic impacts; and
- Total benefits (excluding trade and producer impacts) are expected to be between £72.8 – 74.2 bn.

<sup>130</sup> Airports Commission, 2015. *Economy: Updated Transport Economic Efficiency Impacts*. [\[online\]](#) Accessed 24/12/2015.

<sup>131</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report* This includes benefits to non-UK and international transfer passengers

- 7.4.15 Overall, the impact on jobs at the national level remains subject to uncertainties. Some of the jobs identified by the AC may not be brand new, but displaced from elsewhere in the country due to passengers switching from other airports. Even within the local economy, the number of additional jobs will depend on how many jobs are taken up by people who were previously unemployed. Some jobs may be taken up by the existing stock of workers.
- 7.4.16 Expansion of capacity at one airport may, however, have an adverse impact on the level of activity at another airport. Evidence of this impact is shown in the department's (2017) work on smaller airport passenger numbers in passenger forecasts for Birmingham Airport, for example, are lower under each shortlisted scheme. Taking the NWR scheme, passenger numbers at Birmingham are forecast to be nearly 1.8 million passengers fewer in 2050 than forecasts in the 'Base' Case.
- 7.4.17 Passenger volumes at other airports (such as Birmingham) may grow more slowly than they would do if the London and South East airport system becomes increasingly congested as forecast under the do minimum scenario, but are still expected to be greater than today.

#### LOCAL ECONOMIC IMPACTS

- 7.4.18 The provision of improved, and more varied travel options under the do minimum scenario would improve the resilience of the travel system, and improve accessibility to local employment centres.<sup>132</sup> This benefit would be negated by the expansion of the airport and associated increase in transport demand for surface transport systems. Further enhancements to the surface network are required for accessibility benefits to be maintained in the long term. The surface access requirements identified by the AC were determined using the highest demand scenarios. Therefore they should deliver more than sufficient improvements to accommodate the additional passengers associated with airport expansion under assessment of need (comparable to the DfT's central demand forecast).
- 7.4.19 The number of local jobs supported by the scheme depends on many factors, including the type of airport, size of the airport passenger and employment catchment areas as well as the size of these areas compared to the country as a whole. Reflecting these uncertainties, the DfT developed a range of local employment estimates. These indicated that between 57,000 and 114,000 additional local jobs will be generated by 2030 with between 39,000 and 77,000 jobs generated by 2050<sup>133</sup>. The quantity and distribution of high skilled jobs has not been determined at this stage of the assessment.
- 7.4.20 It is also anticipated that many jobs will be generated during the construction phase. These jobs will be temporary, but could last a number of years, as construction would take place over many years.
- 7.4.21 It is considered likely that airport expansion will serve as a catalyst to business investment in the surrounding area, continuing to attract high value firms<sup>134</sup>.

#### SENSITIVITY ANALYSIS FOR ECONOMY IMPACTS

- 7.4.22 In addition to a "central scenario" (which is comparable to the AC's Assessment of Need scenario) the DfT has also developed a "low scenario" and "high scenario" to reflect uncertainty over future passenger demand and how this show the impacts on economic benefits. The high and low scenarios differ by varying macro-economic assumptions, using the same assumptions as the AC's "Global Growth" and "Global Fragmentation" demand scenarios. Changes to macro-

<sup>132</sup> Jacobs, 2014. *Local Economy Impacts: Assessment*, p. 96. [\[online\]](#) Accessed 24/12/2015.

<sup>133</sup> Department for Transport, 2017. *Airport Capacity in the South East: Updated Appraisal Report* published as part of the Revised Draft NPS consultation.

<sup>134</sup> Jacobs, 2014. *Local Economy Impacts: Assessment*, p 54. [\[online\]](#) Accessed 24/12/2015.

economic assumptions are very influential in affecting estimates of economy impacts, so reporting the “low scenario” and “high scenario” is helpful to show this variability.

- 7.4.23 Whilst these scenarios provide a robust context to the assessment set out in the DfT’s *Updated Appraisal Report*, the central scenario, estimated from DfT 2017 forecasts is the economic scenario included within the main section of this AoS to simplify the presentation of the assessment. The full range of economic outcomes under DfT’s scenarios, however, are presented in the sensitivities section of this Appendix.
- 7.4.24 Although the magnitude varies, under all scenarios expansion would lead to benefits to passengers, the wider economy, trade and local jobs. The conclusions set out against objectives 4 and 5 are still expected to hold in each of the economic scenarios.

## NOISE

- 7.4.25 The noise assessment of the LHR-NWR scheme predominantly shows significant negative effects (--). The significant effects identified are summarised below.
- 7.4.26 This summary refers to a range of scenario assumptions, descriptions of which have been provided in section 6, with further detail available in Appendix A-4.

## NOISE EXPOSURE

- As current flightpaths from Heathrow result in noise exposure over densely populated areas of west London, exposure from aircraft noise is relatively high. Compared with the do minimum in 2030, the additional number of people in the local population predicted to be exposed to noise levels >54 dB  $L_{Aeq,16hr}$  as a consequence of LHR-NWR is 92,700 people by 2030, 52,900 people by 2040 and 36,800 people by 2050 (central scenario).
- The local ground noise assessment for LHR-NWR indicates that the total population exposure to levels  $\geq 57$  dB  $L_{Aeq,16hr}$  in 2030 is expected to be 27,000, similar to the baseline situation (30,650 people in 2013, and 30,750 in 2030). Compared with the do minimum in 2030, population exposure to ground noise >57 dB  $L_{Aeq,16hr}$  is expected to be lower by 3,750. This is due to relocation of some sources of ground noise away from more densely populated areas.

## EFFECTS OF NOISE EXPOSURE ON HEALTH AND AMENITY

- Total DALYs<sup>135</sup> lost to adverse health and amenity effects are expected to be increased by approximately 20,439 over a 60-year period, compared with the do minimum, although potential reductions in sleep disturbance have also been identified (central scenario).
  - Effects on cognitive development of children are expected to be Significant Negative due to broad increases in schools exposed to daytime noise (central scenario).
- 7.4.27 During the construction phase, noise (and potentially, vibration) impacts could be generated by on-site traffic, works, plant and off-site traffic. It is considered that negative construction noise and vibration impacts have the potential to be significant, depending on the nature and extent of the works and mitigation proposals.

<sup>135</sup> Disability-Adjusted Life Years, a measure used internationally to quantify human health impacts. See WHO definition at: [http://www.who.int/healthinfo/global\\_burden\\_disease/metrics\\_daly/en](http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en)

## SENSITIVITY ANALYSIS

- 7.4.28 General outcomes of the sensitivity testing presented in Appendix A-4 have been summarised in section 6. Adoption of the high demand scenario for LHR-NWR has the effect of reducing the expected noise impacts. This somewhat counter-intuitive outcome can be understood by considering that the higher demand scenario affects the ATM forecasting both with and without expansion (ie in both do minimum and do something cases). The assessment indicates that, relative to the central scenario equivalent, the numbers of people affected by noise in the high demand scenario increase more without expansion than with expansion. Since the noise impacts of the scheme are evaluated by comparing the future expanded airport against a future without expansion, the noise impacts are reduced.
- 7.4.29 This result is also reflected in the estimated total DALYs lost to adverse health and amenity effects due to noise exposure, which under the high demand scenario are reduced to 18,957 (compared with 20,439 in the central scenario). In particular, the anticipated future (beneficial) reductions in sleep disturbance are actually expected to be larger in the high demand scenario, which can be explained by the additional flexibility enabled by an expanded LHR-NWR Heathrow, which would be better able to distribute the higher demand additional ATMs throughout the day; by contrast, a constrained two-runway LHR would only be able to accommodate higher demand by increasing capacity during night-time shoulder hours, which would negatively impact on sleep disturbance.

## BIODIVERSITY

- 7.4.30 The HRA screening<sup>136</sup> (Stage 1) identified that the LHR-NWR scheme has either, the potential to result in likely significant effects, or there is uncertainty as to whether likely significant effects would arise. Where such uncertainty exists it is necessary to apply precaution and assume that likely significant effects could arise. Potential likely significant effects have been identified at;
- Southwest London Waterbodies SPA
  - Southwest London Waterbodies Ramsar
  - Richmond Park Special Areas of Conservation (SAC)
  - Windsor Forest and Great Park SAC
  - Burnham Beeches SAC
  - Thursley, Ash, Pirbright and Chobham SAC
  - Wimbledon Common SAC
  - Thames Basin Heaths
- 7.4.31 With the exception of Southwest London Waterbodies, the potential likely significant effects have been identified with regard to air quality impacts associated with increased traffic flow, and direct and indirect impacts upon supporting habitat as a result of the surface access strategy.
- 7.4.32 Eight European sites are located in immediate proximity (< 200 m) to major roads leading to Heathrow. All sites are assessed as vulnerable to nitrogen deposition and are currently in exceedance of nitrogen (or in the case of Southwest London Waterbodies, are close to exceedance of the nitrogen critical load). Further investigations are required with regard to the effects of nitrogen deposition on the qualifying features of the sites in order to quantify any changes resulting from the scheme.

<sup>136</sup> WSP, 2015. *Aviation Capacity Habitats Regulations Assessment Screening Assessment*.

- 7.4.33 The maximum predicted annual mean concentrations of nitrogen oxides and nitrogen deposition fluxes was calculated for Southwest London Waterbodies SPA and Ramsar and it was identified that the LHR–NWR scheme would result in additional deposition. The greatest incremental change being at Staines Moor: 1.2 kgN/ha/yr (representing an increase of 11.8%). Although this does not result in a new exceedance it is concluded that this additional contribution could act in combination with other sources of nitrogen deposition (arising from other plans and projects) and result in adverse effects on the integrity of the SPA and Ramsar.
- 7.4.34 There would, in addition, be a new exceedance of the ambient NO<sub>x</sub> Critical Level at the South West London Waterbodies SPA/Ramsar (an annual mean ambient NO<sub>x</sub> concentration of up to 32.4 µg/m<sup>3</sup> for LHR–NWR, the Critical Level for annual mean NO<sub>x</sub> concentration is 30 µg/m<sup>3</sup>). As a result, further investigation is required regarding the sensitivity of the habitats to concentrations of ambient NO<sub>x</sub>. In the absence of evidence to the contrary and with recourse to the Precautionary Principle, it is considered possible that the air quality impacts of scheme will contribute additional NO<sub>x</sub>-related adverse effects on the integrity of the European site.
- 7.4.35 Roads within 200 m of Wimbledon Common SAC, Thames Basin Heaths, Thursley SAC, Windsor Park SAC, Richmond Park SAC, and Burnham Beeches are located within proximity to roads potentially leading to Heathrow. No data is currently available regarding the estimated nitrogen deposition rates at these European Sites arising from the scheme. In the absence of evidence to the contrary, it is considered that at this stage it cannot be ruled out that there will be an increase in traffic at these roads and that corresponding air quality impacts will act cumulatively and in-combination and result in adverse effects on the integrity of the European sites.
- 7.4.36 For Southwest London Waterbodies the following additional likely significant effects were identified:
- Surface access proposals for the scheme may involve land take and disturbance primarily along the existing M25 motorway corridor. There is potential for surface access routes to overlap with the boundaries of sites that include SSSI components of the SPA and other potential functionally linked habitat- Further the scheme includes the loss of Old Slade Lakes LWS, which provides functional support to the SPA.
  - Southwest London Waterbodies is located adjacent to the scheme site. Whilst some existing baseline habituation of the interest features to disturbance effects is likely it cannot be assumed that additional levels of disturbance would not result in a cumulative impacts to the interest features.
  - The scheme has the potential to result in impacts to hydrological systems such as the River Colne and wetland environments adjacent to the SPA/Ramsar that support the interest features.
  - Increased levels of bird scaring/control as part of birdstrike risk management measures could cause effects to other non-target waterbird species including the SPA/Ramsar interest features.
- 7.4.37 Accordingly further consideration has been undertaken by way of Appropriate Assessment<sup>137</sup> (Stage 2 of the HRA process) to determine whether the scheme would result in adverse effects to the integrity of the sites.
- 7.4.38 Surface access proposals for the scheme may involve land take and disturbance in the southern area of the scheme, primarily along the existing M25 motorway corridor. There is potential for surface access routes to overlap with the boundaries of sites that include SSSI components of the SWLW SPA and other potential functionally linked habitat- Applying a buffer zone of 100 m

<sup>137</sup> WSP, *Revised Draft Airports NPS Habitats Regulations Assessment*, published as part of the published as part of the Revised Draft NPS consultation. .

as a potential area of impact around the proposed surface access routes has identified some potential overlap with the boundaries of sites that include Staines Moor SSSI and Wraysbury Reservoir SSSI (and therefore the SW London Waterbodies SPA).

- 7.4.39 Any reduction to the size of the SSSI components would effectively reduce the areas of designated habitat available to the interest features of the SPA. The SW London Waterbodies SPA operates as a network and the pattern of use of the network is varied and influenced by a broad range of factors. Reduction in the areas of component sites could result in a component to be of reduced benefit to the interest features in terms of being of inadequate size or functional change. On a precautionary basis such changes could reasonably be predicted to result in displacement of the interest features to other waterbodies either within the SPA, which could place pressures on unaffected habitats, or displace birds outside of the designated site to areas in the local or wider area that are not afforded the same level of protection.
- 7.4.40 In addition, this impact is predicted to be cumulative with other impacts identified in this assessment including air quality, hydrology, disturbance and recreation.
- 7.4.41 Accordingly any removal of such habitat could reasonably be expected to result in an adverse effect to the integrity of the waterbird populations and as such the integrity of the SPA.
- 7.4.42 With regards to disturbance the AA concluded that there is insufficient evidence available at this time to indicate that the existing airport operations at Heathrow result in adverse disturbance effects to the SW London Waterbodies SPA. Furthermore, there has been a degree of unsubstantiated assumption that the interest features are tolerant or habituated to these effects. However any tolerance or habituation is unsubstantiated and further cannot be assumed to apply to additional cumulative disturbance from increased airport operations and the associated disturbance arising from LHR-NWR.
- 7.4.43 This is further compounded by the existing levels of recreational disturbance which are considered to be a significant issue for the SPA and this baseline must be considered against any further disturbance effects cumulatively. Further there are disturbance pressures relating to gravel extraction, and operation of the waterbodies as reservoirs.
- 7.4.44 Cumulatively these effects are difficult to differentiate however it is considered likely that the existing levels of disturbance pressure on the SW London Waterbodies SPA may have a limiting factor to the integrity of the site. Given the uncertainty surrounding flight paths and flight heights for the schemes at this time and equally a general lack of broader scientific understanding of the effects of aviation disturbance to waterbirds the precautionary principle requires that any further disturbance effects would be likely to result in cumulative disturbance to the interest features of the site and as such an adverse effect to the sites integrity.
- 7.4.45 The LHR-NWR scheme would require the diversion of several rivers and streams and the incorporation of a number of significant culverts. It is assessed that even with the incorporation of careful design and mitigating features, residual adverse effects on water quality and quantity from such major diversions would be likely. Changes to water quality within the SPA and Ramsar or supporting habitat could also occur through the release of contaminants during construction or operation (for example, cleaning agents and de-icers).
- 7.4.46 As a result of the immediate proximity of SPA components to the scheme footprint (including SPA supporting habitat as described above), it is considered reasonably likely that the residual adverse water quantity and quality effects referenced will be apparent.
- 7.4.47 Further investigation as to the effects of the likely changes in quality and quantity of water on the interest features of the site will be necessary at the project-level HRA once further details are available. However, for the purposes of the AA, recourse is given to the Precautionary Principle and adverse effects are considered likely on the integrity of the European sites.

- 7.4.48 The footprint of the LHR-NWR will remove a number of agricultural fields that attract significant numbers of pigeons and particularly Canada Geese following the harvesting period and that also attract gulls following ploughing and seed sowing activities. This reduction in potential birdstrike risk is likely to be offset by the fact that the western boundary will be significantly closer to Queen Mother Reservoir, which supports a very large gull roost numbering up to 20,000 birds during the winter months as well as a significant number of other waterfowl. At present aircraft departing to, or arriving from, the west are sufficiently high when passing over the reservoir that they rarely encounter roosting gulls.
- 7.4.49 Moving the runway closer to this reservoir may mean that aircraft arriving or departing on the western end will be low enough to conflict with gulls spiralling over the reservoir or those arriving at the roost from feeding sites, such as landfills, situated to the north or north east. This would create a significant additional birdstrike risk which would need to be managed.
- 7.4.50 Further work is therefore needed to determine the arrival directions and flight altitude of birds using Queen Mother Reservoir in particular, and the reservoirs to the west of Heathrow in general, so that the likely additional risk can be properly assessed.
- 7.4.51 Increased levels of bird scaring/control as part of birdstrike risk management measures could cause effects to other non-target waterbird species including the SPA interest features. Given the uncertainty surrounding flight paths and flight heights for the schemes at this time the precautionary principle requires that any further disturbance effects would be likely to result in disturbance to the interest features of the site and as such an adverse effect to the sites integrity.
- 7.4.52 On the basis of information that is available or can be reasonably obtained, and in accordance with the Precautionary Principle, it has not been possible to rule out adverse effects on the integrity of the above Natura 2000 sites, either alone or in combination with other plans and projects, with respect to each site's conservation objectives.
- 7.4.53 Where mitigation does not conclude an absence of adverse effects on integrity, both alone and in-combination, further assessment of the Airports NPS would be required under Stages 3 and 4 of the HRA process.
- 7.4.54 Stage 3 is the assessment of alternative solutions; where adverse effects can't be ruled out, the process which examines alternative ways of achieving the objectives of the plans or projects that can avoid adverse effects on the integrity of the Natura 2000 site.
- 7.4.55 Accordingly in relation to the proposed Policy consideration has been given to the tests of whether alternative solutions, imperative reasons of overriding public interest (IROPI) and compensatory measures are available under Article 6(4) of the Habitats Directive. The assessment of alternative solutions has considered whether there are any feasible ways to deliver the overall objectives of the proposed plan, which will be less damaging to the integrity of the European sites affected. The two other schemes shortlisted by the Airports Commission have been considered against the objectives of the plan in relation to meeting the need to increase airport capacity in the South East and maintaining the UK's hub status. Whilst the Heathrow Extended Northern Runway scheme (LHR-ENR) would meet both of these objectives, the Gatwick Second Runway scheme (LGW-2R) would not. The assessment of the LHR-ENR scheme shows it would be no less damaging to European sites and as such is not an alternative solution.
- 7.4.56 Stage 4 is the assessment where no alternative solutions exist and where adverse effects can't be ruled out; an assessment of whether the development is necessary for IROPI and, if so, of the compensatory measures needed to maintain the overall coherence of the Natura 2000 network.
- 7.4.57 Notwithstanding the conclusion above, the AA undertaken for the two other shortlisted schemes also led to no suitable alternative solutions to LHR-NWR being identified. Further, the basis on which it could be concluded that the LHR-NWR scheme needed to be carried out for IROPI has

been examined and it is considered that the needs case underpinning the Airports NPS sufficiently fulfils those reasons. In any event, the Airports NPS provides that no consent will be granted unless there is full compliance with Article 6(3) or Article 6(4) of the Habitats Directive and that any necessary compensatory measures will be secured in accordance with Regulation 66.

#### IMPACTS TO NATIONALLY DESIGNATED SITES

7.4.58 The LHR-NWR scheme has the potential for indirect impacts on a number of SSSIs (listed below) from air and water quality changes.

- Staines Moor SSSI;
- Wraysbury Reservoir SSSI;
- Wraysbury No.1 Gravel Pit SSSI;
- Wraysbury & Hythe End Gravel Pits SSSI; and
- Kempton Park Reservoirs SSSI.

7.4.59 The potential impacts could occur both alone and in-combination. Air and water quality changes could result in adverse effects to the habitats and species interest features of these sites. In addition to the legal protection afforded to SSSI under the Wildlife and Countryside Act the NPPF states that:

*'proposed development on land within or outside a Site of Special Scientific Interest likely to have an adverse effect on a Site of Special Scientific Interest (either individually or in combination with other developments) should not normally be permitted.*

*Where an adverse effect on the site's notified special interest features is likely, an exception should only be made where the benefits of the development, at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of Sites of Special Scientific Interest';*

#### IMPACTS TO LOCALLY DESIGNATED SITES

7.4.60 The LHR-NWR scheme involves direct land take impacts on three local non-statutory designated sites (Old Slade Lake LWS, Lower Colne SMINC and Stanwell II SNCI).

7.4.61 It is considered that significant negative impacts to international, national and local designated sites would occur as a result of the LHR-NWR scheme.

#### IMPACTS TO HABITATS AND SPECIES

7.4.62 Losses of priority habitats as a result of the LHR-NWR scheme would include deciduous woodland, traditional orchard, rivers and brooks, reedbeds and lowland meadows.

7.4.63 There are birdstrike management issues for LHR-NWR associated with the nearby complex of open water bodies. The western threshold of the extended runway will be significantly closer to the complex of reservoirs and gravel pits to the west of the airport including sites designated as part of the SWLW SPA and Ramsar site. The closer proximity of the runway and increased air traffic is likely to result in an increased strike risk, and a corresponding requirement for an increase in bird management and control activities is anticipated.

- 7.4.64 Methods of deterring/scaring and controlling bird species potentially hazardous to aviation operations could potentially have an adverse effect on non-target species and biodiversity including those not listed on the designation interest features.
- 7.4.65 Compensatory habitats created as offset for the scheme proposals will need to be designed in such a way as to deter/not attract birds hazardous to aviation operations or be sited sufficiently far away for increased strike risks to be insignificant and this may limit the biodiversity benefits for some of the proposed compensation areas close to the proposed scheme.
- 7.4.66 As per the baseline section based on the available information the presence of key protected species including pennyroyal, bats, otter, water vole, reptiles (including grass snake and slow worm), and various species of birds within 2 km of the scheme boundary have been identified. It is considered feasible that the area would support a range of other species protected under EU and UK wildlife legislation including but not limited to dormice, and great crested newts.
- 7.4.67 The recommendation to add a 10% compensation allowance based on overall land take to allow for compensation for protected species is recognised to be arbitrary and for the purposes of this assessment appropriate however due to the information available at this time it must be recognised with the associated limitations and given the complexity of some of the habitats and species that might be affected significant risk remains with regard to viable mitigation and compensation.
- 7.4.68 It is considered that significant negative impacts to habitats, species, valuable ecological networks and ecosystem function would occur as a result of the LHR-NWR scheme.

## SOIL

- 7.4.69 LHR-NWR is expected to have a neutral effect on geodiversity as no impacts on Geological SSSIs or RIGS are expected.
- 7.4.70 Greenfield (including agricultural land) is a finite resource, and its loss cannot be compensated through provision of land elsewhere. Agricultural land loss is 431 ha out of a total of 906 ha and although the quantity of land lost is likely to vary, a significant proportion is likely to be 'Best and Most Versatile' agricultural land. The loss of agricultural land would typically be financially compensated for rather than mitigated against. However, whilst it would be possible to compensate for the financial loss, this would not address the effects associated with this loss of resource for food and other benefits. The effect is assessed as significant negative.
- 7.4.71 Construction and operation activities have the potential to pollute soils. Development of land will affect soil resources (including physical loss of and damage to soil resources) associated with land contamination (from potential substance release) and structural damage (from potential compaction, burial, mixing, etc.). Indirect impacts may also arise from changes in the local water regime, organic matter content, soil biodiversity, and soil process.
- 7.4.72 Mitigation will be incorporated within design, and best practice construction measures which will reduce the potential for contamination or loss of soil resources through contamination. It is anticipated that best practice measures, which will be set out at detailed design, will avoid the creation of pathways to other sensitive environmental features. Potential adverse effects associated with soil resources are of minor significance.

## WATER

- 7.4.73 LHR-NWR could impact surface water and groundwater quality from polluted runoff during construction and operation, including sediment (construction) and de-icers, cleaning agents and cadmium (operation). This would also lead to a decrease in pesticides and herbicides applied to the land. It is assumed that a Construction Environmental Management Plan (CEMP) will be implemented, which would include procedures to reduce the residual risks during construction. It is also assumed that design would incorporate pollution control measures, such as storing potentially polluting substances away from surface watercourses and areas with permeable soils. However, there will be some residual pollution at times.
- 7.4.74 Reviews of the current WFD objectives in the Thames Catchment Management Plan<sup>138</sup> show that the water bodies are as a rule classified as “heavily modified” and while some are of poor or moderate quality, improvements are scheduled for the 2027 target.
- 7.4.75 For this scheme, long term storage would be provided to delay the additional surface water volume from being discharged to watercourses, by infiltration, rainwater harvesting or by restricting the discharge rate to 2 litres per second per hectare (l/s/ha). Surface runoff from paved areas (which is likely to be contaminated) would receive at least two levels of treatment.
- 7.4.76 There is potential for hydrological conditions to be altered on Staines Moor SSSI from diversion of the River Colne and this would need to be addressed during detailed design. There are also a number of reservoirs and gravel pits which make up the SWLW SPA further downstream from the Airport, although at the strategic level any effect on ecological status is anticipated to be negligible (see HRA for effects on birds).
- 7.4.77 Significant watercourse replacement with diverted/realigned channels is proposed with approximately 12 km of watercourse impacted. The diversion of approximately 1 km of the Colne Brook around the western end of a new runway, diversions of parts of the Duke of Northumberland’s River and River Colne to the south of the new runway and creation of a new channel (the ‘River Colne Spur’) would be technically difficult and are considered likely to have significant effects on hydromorphology and geomorphology. The WFD aims to enhance and maintain good status of all waterbodies, this scheme would involve culverting of around 3 km of additional culverts. Additionally the River Colne and Wraysbury River would be combined into a single culvert, and the Duke of Northumberland’s and Longford Rivers would be combined into a single culvert, reducing total channel length and change morphological and ecological conditions. This could have impacts on channel processes, ecology and fisheries.
- 7.4.78 The waterbodies designated under the WFD that have a risk of deterioration under this scheme, based upon current design assumptions, are the Colne (confluence with Chess to River Thames) (GB106039023090) and Colne Brook (GB106039023010).
- 7.4.79 The assessment has found that this scheme would result in deterioration of the water environment particularly in terms of the WFD, in which the design would be required to progress through Article 4.7 (of the WFD) which requires a case to be proven that any environmental damage is outweighed by a greater public need (in this case for an airport development). Article 4.7 is the ultimate stage in the WFD assessment and is implemented when all design processes have been exhausted and no technically feasible or economically viable alternatives have been identified. The assessment process has not yet reached this stage and is considering potentially viable schemes at a plan level.

<sup>138</sup> Environment Agency, 2016. *Crane Rivers and Lakes*. [\[online\]](#) Accessed 15/05/16.

- 7.4.80 Appendix B outlines the reasons why the long-list of alternatives considered by the AC was reduced to a short-list of three schemes. All three schemes would require Article 4.7 including the LHR-NWR proposal. Within the short-list, LHR-NWR has been selected for the reasons set out in Section 3 of the NPS and summarised under Section 7.3 above, including meeting the need to provide a global hub.
- 7.4.81 LHR-NWR incorporates an effective barrier to passage in both water and ecological terms which would result in a decrease in waterbody status under the WFD. Project level design would need to determine whether the detrimental impact can be mitigated, offset and where a like for like replacement is not possible, compensation within a wider environmental framework should be acceptable.
- 7.4.82 There is potential for a 10 to 15% saving on current potable water demand through the use of waste water recycling and/or reverse osmosis. Rainwater harvesting is expected to account for 2% of the additional demand. The potable demand will be met by Affinity Water whose WRMP concluded that there is a deficit in the water resource zone.
- 7.4.83 The proposed runway will extend onto the floodplains of the River Colne, Wraysbury River and the Colne Brook. This will result development occupying floodplain areas designated as Flood Risk Zones 2 and 3. However, the existing fluvial flood risk to Heathrow Airport, established from flood risk mapping and recent flood events, is low.
- 7.4.84 The development is expected to lead to a loss of up to 40 ha of undefended flood plain with 47 ha being set aside for compensation purposes. This is likely to lead to an increase in the overall flood storage for the catchment. The progression of the mitigation solution design will need to detail how the mitigation will be achieved and how it will be implemented to ensure that there is no detrimental impact on the conveyance. Analysis of surface water flood mapping indicates that there are isolated areas within the extended footprint that are at medium or high risk of surface water flooding.
- 7.4.85 Heathrow Airport and the proposed new runway are located on River Terrace Gravels, which is classified as a Secondary Aquifer. Various groundwater studies have highlighted the potential for elevated groundwater levels and/or groundwater flooding in the area. It is considered that groundwater flood risk is a concern across the proposed site. There are also implications of climate change on flooding the River Terrace Gravels that would need to be taken into account.
- 7.4.86 To ensure that the scheme is able to adapt to meet the impacts of climate change, consideration has been given by the applicant to the incorporation of additional peak rainfall in the design of the surface water drainage strategy. Further consideration of the latest climate change guidance for rainfall and river flows will need to be incorporated into the scheme design, along with the potential impacts upon the River Terrace Gravels.

## AIR QUALITY

### EU DIRECTIVE LIMIT VALUE COMPLIANCE

- 7.4.87 WSP's updated reanalysis of the AC's impact assessment in relation to compliance with the EU Directive limit values, taking into consideration the Government's 2017 Air Quality Plan, indicates that LHR-NWR does not impact on modelled compliance with limit values in the re-analysis core scenario (i.e. taking account of updated vehicle emissions factors, and with the measures set out in the Air Quality Plan implemented).
- 7.4.88 The conclusion is, however, subject to uncertainty. The risk of an impact on compliance with limit values increases the earlier the assumed opening year. For early opening (assessed for 2026 in the re-analysis), the risk is high and the option is likely to impact on compliance with limit values due to impacts in central London. The risk falls to medium in 2030.

- 7.4.89 Impacts near the airport do not, in general, affect zone compliance. That is to say, whilst the scheme impacts on compliance with EU limit values alongside some roads in the vicinity of the airport in some sensitivity tests in the updated re-analysis, total pollutant concentrations in central London with the scheme are generally higher.
- 7.4.90 As such, the level of risk is primarily dependent on the timing of the introduction of, and effectiveness of, measures in the Government's 2017 Plan. It is largely independent of assumptions relating to the impact of the option itself, the rate of growth in demand or the direct mitigation of option-related emissions.

#### POLLUTANT EMISSIONS

- 7.4.91 The National Atmospheric Emissions Inventory (NAEI) projects UK total emissions of NO<sub>x</sub> and PM<sub>2.5</sub> up to and including the year 2030. These projections include emissions from Heathrow Airport without expansion.
- 7.4.92 The AC's assessment states that LHR-NWR is predicted to increase emissions of NO<sub>x</sub> from the Traffic Model Simulation Area by 2.5 kt/yr (0.5%). Taking into account the latest NAEI projections (published in 2016), this would increase emissions from 531 kt/yr to 534 kt/yr. PM<sub>2.5</sub> emissions increase by 0.1 kt/yr, from 97.0 kt/yr to 97.1 kt/yr (an increase of 0.12%).
- 7.4.93 Total UK emissions of NO<sub>x</sub> in 2030 are expected to meet the Gothenburg Protocol target emission reduction commitment for 2020 but are currently projected to exceed the NECD commitment for 2030; emissions of PM<sub>2.5</sub> are currently projected to exceed their targets for 2020 and 2030.
- 7.4.94 The current baseline NAEI 2030 projections are 122.4% of the NECD 2030 NO<sub>x</sub> target with the proportion increasing to 122.9% with the additional runway.
- 7.4.95 LHR-NWR is expected to increase total UK emissions of PM<sub>2.5</sub> by around 0.2% of the NECD 2030 target. The baseline NAEI 2030 projections are 159.0% of the NECD 2030 PM<sub>2.5</sub> target, increasing to 159.2% with the north-west runway.
- 7.4.96 DfT's latest estimate of ATMs with the new runway are higher than assessed by the AC, by around 9%. This has only a marginal impact on emissions, with NO<sub>x</sub> emissions potentially increasing by 2.8 kt/yr with DfT demand model in comparison to the 2.5 kt/yr assessed by the AC.

#### UK AIR QUALITY OBJECTIVE COMPLIANCE AND POPULATION EXPOSURE

- 7.4.97 In the AC's assessment, the maximum modelled annual mean NO<sub>2</sub> concentration with the scheme in place at any receptor is 34.7 µg/m<sup>3</sup> and occurs to the north-east of the airport, at Bath Road (A4)<sup>139</sup>. The maximum incremental change brought about by the scheme at any receptor is 10.8 µg/m<sup>3</sup> and occurs to the north-west, adjacent to the new third runway, where the predicted concentration for the Heathrow NWR Scheme is 32.9 µg/m<sup>3</sup>.<sup>140</sup>
- 7.4.98 Predicted PM<sub>10</sub> concentrations are all well below the annual mean AQO. The predicted incremental changes in PM<sub>10</sub> concentrations are all less than 6 µg/m<sup>3</sup>.
- 7.4.99 There are 47,063 properties where annual mean NO<sub>2</sub> concentrations within the Principal Study Area are predicted to be higher with the scheme (on average by 0.9 µg/m<sup>3</sup>), with 121,377 people

<sup>139</sup> Jacobs, 2015. Module 6: *Air Quality Local Assessment, Detailed Emissions Inventory and Dispersion Modelling*, p. 64. [\[online\]](#) Accessed 16/06/2016.

<sup>140</sup> Jacobs, 2015. Module 6: *Air Quality Local Assessment, Detailed Emissions Inventory and Dispersion Modelling*, p. 64. [\[online\]](#) Accessed 16/06/2016.

affected. There are 14 “at risk” properties ( $>32 \mu\text{g}/\text{m}^3$ ) that would experience an increase in annual mean  $\text{NO}_2$  concentrations.

- 7.4.100 Should the new runway be operational prior to 2030, there is risk of worsened exceedance of the UK’s air quality objective for annual mean  $\text{NO}_2$ , albeit a relatively low risk if the Government’s actions to improve air quality are fully and effectively implemented.

### ECOSYSTEM IMPACTS

- 7.4.101 The LHR-NWR scheme would not cause any new exceedances of the lower or upper bounds of Nitrogen Deposition Critical Loads. The scheme is predicted to cause new exceedances at the South West London Waterbodies RAMSAR / SPA and the Wraysbury Reservoir SSSI, however it is judged that the Critical Level does not strictly apply at these locations (based on the macro-scale siting requirements for monitoring in the EU Directive).

### CARBON

- 7.4.102 Carbon emissions have been assessed over a 60-year appraisal period under two climate change policy scenarios: carbon-traded, and carbon-capped using a similar growth and policy scenarios to the AC. Carbon emissions from the airport are associated with air travel, ground movement of planes, passenger surface access journeys, and airport operations energy and fuel use. Aviation makes up over 90% of the total carbon emission associated with LHR-NWR over the 60 year appraisal period<sup>141</sup>.
- 7.4.103 The key figures relating to aviation emissions in 2026 and 2050 and their relationship to UK National aviation emissions are summarised in Table 7.2 below, along with a summary of passenger surface access emissions for the same periods:

**Table 7.2: LHR-NWR Summary of Annual Emissions over Appraisal Period under Carbon-Capped and Carbon-Traded Scenarios (Central demand scenario)**

Year	2026	2050	2026	2050	2026	2050	2026	2050
<b>Emissions Source / Scenario</b>	<b>Do Minimum, Carbon-Capped</b>		<b>Do Minimum, Carbon-Traded</b>		<b>Do Something, Carbon-Capped</b>		<b>Do Something, Carbon-Traded</b>	
Aviation Emissions (MtCO <sub>2</sub> )	20.55	15.11	20.70	15.99	24.71	19.23	24.89	20.35
Contribution to UK Aviation Emissions (%)	53.1%	41.2%	53.1%	43.2%	59.6%	51.4%	59.1%	50.9%
Passenger and Staff Surface Access Emissions (MtCO <sub>2</sub> )	0.46	0.48	0.46	0.48	0.55	0.64	0.55	0.64

<sup>141</sup> Jacobs, 2015. *Module 8: Carbon, Carbon Further Assessment*, Table 2.12. [\[online\]](#) Accessed 04/01/2016.

- 7.4.104 The demand scenario considered was the DfT's central aviation demand forecast, A sensitivity test has been carried out to examine the impact on emissions of demand under a "worst-case" scenario (see Appendix A9 Carbon for further details).
- 7.4.105 The impacts on carbon emissions will arise directly from the development of the airport and also cumulatively with development elsewhere, including major road and rail infrastructure developments planned under plans, policies and programmes such as the National Networks NPS, or from major residential and commercial development. Major rail infrastructure schemes which are located nearby include HS2, and Crossrail and also improvements to the road network including the M25. The nearby local authorities all have plans for housing and employment growth, and these will also contribute to increasing carbon emissions.

## RESOURCES & WASTE

- 7.4.106 Environmental, social and economic impacts exist across the lifecycle of construction materials. Impacts exist from the point they are mined, extracted or harvested in their virgin state, to their subsequent processing, manufacture, fabrication, transportation, installation, use, maintenance and end of useful life disposal. Impacts include: consumption of non-renewable resources (direct); degradation / depletion of the natural environment (direct); generation of waste and impacts on landfill (direct); carbon emissions and water scarcity (climate change) (indirect); and nuisance to communities (indirect).
- 7.4.107 There is currently no data or information on the likely volume, type or breadth of materials required to deliver the construction and operation of LHR-NWR. However, due to scale of the infrastructure proposed, the anticipated effects of material consumption are assessed to be significant negative.
- 7.4.108 No forecast data on waste arisings from the construction phase were presented for LHR-NWR. However, given the scale of airport expansion projects, and in the context of the data forecast and presented by LGW-2R, waste arisings from excavation, construction and demolition has the potential to be in the order of magnitude of millions of tonnes.
- 7.4.109 In addition to the demolition of the British Airways headquarters and a number of large hotels, the demolition of the Lakeside EfW would need to be progressed to allow the LHR-NWR scheme to progress. This would increase quantities of waste arising during the construction phase and present a variety of issues for local and regional waste management after demolition. Increased transportation costs and alternative routing for some waste authorities – both within the London region and further afield - would also potentially be required if alternative facilities are used.
- 7.4.110 Operational waste forecasts from passengers are presented in detail across a range of scenarios and years between 2030 and 2050 for LHR-NWR.
- 7.4.111 Due to scale of the infrastructure proposed, the anticipated effects of waste arisings are assessed to be significant negative.

## HISTORIC ENVIRONMENT

- 7.4.112 The impact of the construction activities in the land take will impact all heritage assets including Scheduled Monuments, Conservation Areas, Listed Buildings and the below-ground archaeological remains. The loss or partial loss of listed buildings, their fabric and below-ground remains will have a negative impact, or cause harm to the cultural heritage significance of these assets. The loss of an asset which is associated with another asset could impact on, or cause harm to, the significance of the latter asset. Although all types of heritage assets will be affected through harm to their setting this could be avoided or mitigated possibly through good design. Whether the avoidance of harm will be complete or partial is dependent upon the scheme details.

- 7.4.113 The assessment identified direct, permanent, physical negative impacts of large significance on 27 designated assets within the scheme Land Take Study Area (including the surface access corridors); the setting of a further 54 designated assets could be subject to direct, long-term large negative impacts within the Intermediate Study Area, and from 300 m to 2 km (the Outer Study Area) the setting of a further 166 designated assets could potentially be affected to a moderate level of direct and long-term negative impact (significant negative).
- 7.4.114 One hundred and sixty-seven non-designated archaeological remains, as identified from the HER search, within the scheme land take which will be subject to direct, permanent and negative physical impacts. As the cultural heritage significance of any such assets is as yet unknown the significance of the impact cannot be quantified although a precautionary approach has been applied and the impact assessed as significant negative. The loss of additional unrecorded archaeological remains (numbers unknown) and non-designated assets within the Land Take Study Area is also likely. The impact within the intermediate area will be on the setting of 90 non-designated assets.
- 7.4.115 The scheme can contribute to a minor extent to the conservation or enhancement of the historic environment including landscapes, townscapes, buildings, structures and archaeological remains. Following more detailed mitigation proposals positive impacts could be realised through addressing heritage at risk (including those assets that become at risk as a result of the scheme), enhancement to conservation areas, improving the setting of heritage assets, mitigating noise impacts, community engagement, improving access to/or interpretation of assets and understanding and appreciation of assets. In addition, adopting the use of green space in areas of high or known archaeological potential will also contribute to enhancement.
- 7.4.116 During operation there is the potential to impact in a negative manner on the setting of heritage assets as a result of increased numbers of aircraft overflying the heritage assets. There are likely to be increased light levels from construction and operational lighting in addition to any lights from aircraft whilst on the ground and in flight. This impact will result in loss to the significance of the assets. There is unlikely to be an impact on below-ground archaeological remains from this kind of impact.
- 7.4.117 The assessment acknowledges that the level of harm to the significance of the heritage assets and their settings must be considered. In order to do this there needs to be an assessment of the significance of any heritage assets (including any contribution made by their setting) together with the impact of the proposed development on that significance and the steps that have been taken to avoid/minimise any possible harm. The level of detail should be proportionate to the asset's importance and no more than is sufficient to understand the potential impact of the proposal on their significance. In addition, it is important to consider possible impacts (including cumulative) on the wider historic environment in order to move away from an assessment simply based on individual heritage assets. This detailed level of assessment will serve to inform any subsequent design proposals and mitigation strategy.

## LANDSCAPE

- 7.4.118 Heathrow Airport sits within a largely man-made landscape comprising urban and industrial development interspersed with several reservoirs and large water areas following restoration of sand and gravel workings. The Chilterns AONB, the nearest nationally designated landscape, lies over 15 km to the north west of the proposed Heathrow expansion schemes. A locally designated Area of Landscape Importance, four Registered Parks and Gardens, Areas of Open Access land, areas of statutory Green Belt, and the Thames Path National Trail lie within the 5 km of Heathrow Airport.
- 7.4.119 There would be no direct effects on landscape character within nationally designated landscapes; indirect effects would arise in areas with intervisibility of the scheme and changes in current flight patterns. Potential effects cannot be assessed until further information is available regarding the direction / height / number of flights over the AONBs.

- 7.4.120 LHR-NWR would both involve partial loss of the Colne Valley Regional Park resulting in a negative impact during construction and reducing in magnitude during operation. With mitigation, LHR-NWR would have a positive effect on some PRoW. It would have a significant negative impact on the Hillingdon Lower Colne Floodplain LCA which could not be mitigated effectively in the longer term. At operation LHR-NWR would have negative effects on the Hillingdon Historic Core.
- 7.4.121 LHR-NWR would have a significant negative on views from Harmondsworth and Sipson villages and Harmondsworth Moor.
- 7.4.122 In the absence of proposed definitive flight routes, potential impacts on tranquillity and views, including dark skies, from increased aircraft activity associated with LHR-NWR cannot be assessed with accuracy in relation to potential effects on the Chilterns AONB at this stage.

## 7.5 MITIGATION AND ENHANCEMENT

- 7.5.1 A mitigation hierarchy has been applied as set out in Section 3.3.22 above. The order of preference for mitigation applied is:
- Prevent or avoid;
  - Reduce or minimise;
  - Offset, ameliorate or compensate.
- 7.5.2 As described in section 3.3.25 above, some mitigation has been included within the topic-based assessments where measures have been put forward as part of the promoter's proposal, or are required by environmental legislation or are standard best practice.
- 7.5.3 Further options for mitigation have been identified where significant effects or uncertainties have been identified as part of the AoS process. In addition, mitigation measures have also been proposed for the potential minor effects identified specifically to deal with issues raised by the statutory bodies. This section identifies where residual effects remain.
- 7.5.4 In addition to mitigation, measures have been identified to enhance positive effects.
- 7.5.5 It is anticipated that proposals put forward by the promoter will be undertaken as a minimum, but these will be re-evaluated throughout project design where further mitigation or enhancement is identified. Reference to text included within the NPS is made where specific mitigation is set out within the NPS. Options for mitigation are also presented in the topic based assessments in Appendix A.

Table 7.3: Mitigation for Significant Effects for LHR-NWR

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Community	<p>Loss of residential property, industrial/employment land, community facilities; formal and informal recreation sites, relocation effects upon vulnerable groups; Indirect effects from traffic, air quality and noise.</p>	<p>The promoter has proposed a package of financial compensation, help with relocation and provision of alternative community facilities. This has been referred to within the Airports NPS (5.245):</p> <ul style="list-style-type: none"> <li>To pay 125% of market value plus taxes and reasonable moving costs for all owner occupied homes within the compulsory acquisition zone;</li> <li>To pay 125% of market value plus taxes and reasonable moving costs for all owner occupied homes within an additional voluntary purchase/acquisition zone incorporating the area known as the “Heathrow Villages”;</li> </ul> <ul style="list-style-type: none"> <li>→ Following a third party assessment, to provide full acoustic insulation for residential property within the full single mode easterly and westerly 60 dB LAeq (16 hr) noise contour of an expanded airport;</li> <li>→ Following a third party assessment to provide a contribution of up to £3,000 for acoustic insulation for residential property within the full single mode easterly and westerly 57dB LAeq (16hr) or the full 55 dB Lden noise contours of an expanded airport, whichever is the bigger; and</li> <li>→ To deliver a programme of noise insulation and ventilation for schools within the 60dB LAeq (16 hr) contour.</li> </ul> <p>Additional mitigation incorporated into the Airports NPS for communities includes:</p> <ul style="list-style-type: none"> <li>→ Community Engagement Board - the applicant must engage constructively with a community engagement board throughout the planning process (5.257).</li> <li>→ Community compensation fund –The Government expects that the size of the fund will be proportionate to the environmental harm caused by expansion of the airport. In its consideration of a noise levy the AC considered that a sum of £50 m per annum could be an appropriate amount at an expanded Heathrow and that over a 15 year period a community compensation fund could therefore distribute £750 m to local communities (5.247).</li> </ul> <p>The Government agrees with the AC’s recommendation of no fourth runway at Heathrow Airport. An application for a fourth runway in the vicinity of Heathrow Airport would not be supported in policy terms, and should be seen as being in conflict with the Airports NPS (5.275).</p> <p>The Government will require the applicant to provide details of how plans will improve access on and around the airports with schemes that take account of the accessibility needs of all those who use, or are affected by, surface access infrastructure, including those with physical and /or mental impairments as well as older users (4.76). The applicant would need to set out measures to</p>	<p>Some mitigation has been provided by the applicant. There are a number of additional options for mitigation which would reduce the magnitude of the effect on communities.</p> <p>Nonetheless, the Draft NPS is likely to result in a substantial loss of housing and community facilities that cannot be reversed, the overall effects on community viability caused by loss of housing and community facilities as a result of the proposed LHR-NWR scheme are considered to be significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>minimise or mitigate expansion of surface access arrangements, including targets to reduce car use (5.15-5.20).</p> <p>Additional mitigation is also covered under the noise and air quality topics.</p>	
Quality of Life	Effects on quality of life from traffic, air quality, noise, displacement and employment.	There are a number of options proposed for mitigation measures to reduce magnitude of effects from the AoS topics which comprise quality of life indicators. These are listed in respective appendices for the assessment on Communities (A-1), Noise (A-4) Biodiversity (A-5), Air Quality (A-8) Landscape (A-11) and Historic Environment (A-12). No additional measures have been proposed specifically for quality of life because it is recognised that these measures apply to significant effects on wellbeing.	<p>Although many of the measures proposed are likely to be effective in reducing magnitude of negative effects, the exact package of mitigation would need to be determined for a preferred scheme. The overall effectiveness on reducing negative effects or enhancing positive effects on quality of life is likely to be complex and again should be addressed as part of an assessment for detailed design.</p> <p>For this assessment the residual effects on quality of life remain as assessed, Significant Negative.</p>
Economy	Direct benefits to the economy and wider economic impacts and productivity.	<p>Significant positive effects have been identified within the AoS. The Airports NPS includes the following policy to enhance these effects:</p> <p>→ Skills - Heathrow Airport has publically committed to ensuring 5,000 additional apprenticeships by 2030, this will double the number previously pledged to 10,000. Plans will need to be provided setting out timetable, skills, where the opportunities are offered and other information (5.263).</p>	Policy measures would be expected to enhance significant effects. Residual effects remain significant positive.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Noise	Noise effects on human receptors from exposure to aviation noise.	<p>The mitigation measures proposed by the scheme promoter for the LHR-NWR scheme include<sup>142</sup>:</p> <ul style="list-style-type: none"> <li>→ Incentives to promote incorporation of quieter aircraft in fleet mixes;</li> <li>→ Designing airport infrastructure to be as quiet as possible through positioning of a third runway;</li> <li>→ Compensation and noise insulation schemes for dwellings and community buildings;</li> <li>→ Displacement of runway landing thresholds;</li> <li>→ Development of quieter operating procedures, including steeper approach slopes (discussed further below), and night fleet management;</li> <li>→ Provision of pre-conditioned air (PCA) and fixed electrical group power (FEGP) or ground power units (GPUs) for all aircraft stands to reduce use of auxiliary power units (APUs);</li> <li>→ Reduced taxi and holding times; and</li> <li>→ Use of modern airside equipment such as electric vehicles and clatter-resistant baggage trolleys, maintained using enhanced procedures to avoid excessive noise.</li> </ul> <p>In their Final Report, the AC made a number of further recommendations on mitigation measures for the LHR-NWR scheme, including<sup>143</sup>:</p> <ul style="list-style-type: none"> <li>→ Clear and legally-binding noise performance targets, in the form of a 'noise envelope';</li> <li>→ Periods of predictable respite to be more reliably maintained (discussed further below). The airport operator to work with local communities to determine how respite would best be provided;</li> <li>→ A ban on all scheduled flights during the 6½-hour 'core' night period 2330-0600 hrs (discussed further below);</li> <li>→ Holding the applicant for LHR-NWR to its public commitment to deliver a compensation package valued at more than £1 bn, including £700 m for noise insulation, and significant investment in noise insulation and other support for schools;</li> <li>→ Introduction of a noise levy at major UK airports; and</li> <li>→ Creation of an Independent Aviation Noise Authority and Community Engagement Board under an independent Chair.</li> </ul>	<p>It is acknowledged that effective mitigation strategies can reduce magnitude of noise effects.</p> <p>Likely significant effects depend on project design. At the policy level the assessment remains Significant Negative.</p>

<sup>142</sup> Jacobs, 2014. 5. *Noise: Local Assessment*. p. 205. [\[online\]](#) Accessed 21/12/2015.

<sup>143</sup> Airports Commission, 2015. *Final Report*, chapter 14, pp. 275-310. [\[online\]](#) Accessed 21/12/2015.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>Suggestions made by the AC in their Final Report for ways in which airports can reduce noise at source include<sup>144</sup>:</p> <ul style="list-style-type: none"> <li>→ Preferential routing over areas with lower population densities (discussed further below);</li> <li>→ Steeper descent angles (discussed further below);</li> <li>→ Displaced runway landing thresholds (discussed further below);</li> <li>→ Limiting sharp turns;</li> <li>→ Keeping landing gear up as long as possible;</li> <li>→ New aircraft technology;</li> <li>→ Incentives for airlines to optimise noise performance (eg fines); and</li> <li>→ Air traffic movement limits.</li> </ul> <p>Noise-preferential routing, steeper descent angles and displaced landing thresholds have been investigated as part of the AC assessment work<sup>145,146,147,148</sup>.</p> <p>In addition to the measures listed under Communities above, the NPS provides for developing a package of mitigation measures in consultation with communities includes measures for:</p> <ul style="list-style-type: none"> <li>→ Noise envelope – should be tailored to local priorities and include noise performance targets. The design of the envelope should be defined in consultation with local communities and relevant stakeholders with suitable review periods.</li> <li>→ Night flight restrictions – the Government expects a ban on scheduled night flights of six and a half hours between 23.00 and 07.00. The operation and timing of such a ban should be defined in consultation with local communities and relevant stakeholders in line with EU Regulation 598/2014. In addition, outside the hours of a ban, The Government expects particular efforts to be made to incentivise the use of the quietest aircraft at night.</li> <li>→ Predictable respite –a runway alternation scheme, to provide communities with predictable periods of respite. The timings, duration and scheduling should be defined in consultation with communities and relevant stakeholders.</li> </ul>	

<sup>144</sup> Airports Commission, 2015. Final Report, p. 277, paragraph 14.12. [\[online\]](#) Accessed 21/12/2015.

<sup>145</sup> Multiple references, Jacobs, 2014. 5. *Noise: Local Assessment*. [\[online\]](#) Accessed 21/12/2015.

<sup>146</sup> Jacobs, 2015. 5. *Noise: Local Assessment Addendum*, pp. 1-35. [\[online\]](#) Accessed 21/12/2015.

<sup>147</sup> Jacobs, 2014. 5. *Noise: Local Assessment*, pp. 187-196. [\[online\]](#) Accessed 21/12/2015.

<sup>148</sup> Jacobs, 2015. 5. *Noise: Local Assessment Addendum*, pp. 36-40. [\[online\]](#) Accessed 21/12/2015.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>→ In addition, mitigation measures at the construction stage should be provided and draw on best practice from other major construction schemes, including during the procurement of contractors. (5.54-5.65)</p>	
Biodiversity	Potential adverse effects on internationally, nationally and locally designated biodiversity sites	<p>Mitigation for European sites has been considered in the HRA Appropriate Assessment</p> <p>A range of mitigations were considered in the AA to reduce the effects of air quality impacts on biodiversity including:</p> <ul style="list-style-type: none"> <li>→ Implementation of a CEMP to reduce dust and construction emission impacts;</li> <li>→ Effective application of sustainable transport plans, in particular the use of carbon-efficient and non-road transport ;</li> <li>→ Congestion charges and improved infrastructure for Ultra Low Emission Vehicles for passengers;</li> <li>→ Development and application of appropriate air quality management plans and independently certified offsetting Options (including for example, renewable energy and fuel-switching).</li> </ul> <p>For habitat loss it is considered likely that at the detailed design stage the impacts could reasonably be avoided through a review of the detailed alignment that avoids encroachment into the designated sites or the immediately adjacent habitats.</p> <p>Indirect impacts from works affecting the River Colne could be avoided through the design of channel diversions and minimising culverting requirements.</p> <p>Direct and indirect impacts to SSSI from habitat loss, air and water will require detailed assessment. Mitigation measures would be as per those for water and air below. Subsequent to detailed assessment where mitigation cannot reduce significant effects compensation measures would need to be considered.</p> <p>Loss of locally designated sites will require further consideration at detailed design. Impacts are likely to extend to a range of legally protected / species of importance residing within the sites. Compensation measures will need to be considered on a landscape scale and potentially implemented well in advance of loss to provide functional alternative habitat at the time of impact.</p> <p>Given that the potential for adverse effects on integrity of European sites cannot be ruled out for the policy, in addition to further test under the Habitats Regulations at this stage, the NPS sets out provisions for HRA at the project stage (1.31-1.33).</p> <p>The NPS sets out the requirements for the applicant: In taking decisions, the Secretary of State should ensure that appropriate weight is attached to designated sites of international, national and</p>	<p>Some mitigation has been provided by the applicant. It was recognised that the efficacy of such mitigation Air Quality proposals could not be substantiated, residual adverse effects were assumed on the integrity of the interest features of the European sites.</p> <p>Through maintaining water quality, volume and flow rate to such an extent that adverse effects are avoided then impacts to River Colne, downstream should be prevented. These measures are considered to be viable and robust to prevent adverse effects to integrity</p> <p>Mitigation measures could reduce residual effects to being not significant. However where compensation is required residual effects would be likely in the short-midterm until compensation is fully</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>local importance, protected species, habitats and other species of principal importance for the conservation of biodiversity, and to biodiversity and geological interests within the wider environment. (5.97).</p> <p>The NPS sets out provisions for further assessment under the Habitats Regulations as part of project design (5.99), and processes for determining consent for development which affects SSSIs (5.101) and regional and local sites (5.102).</p>	<p>established and functional.</p> <p>It was recognised that the efficacy of mitigation proposals could not be substantiated at this time; residual adverse effects were assumed on the integrity of the interest features of the European sites. Further consideration at the detailed design stage will be required, including any compensation measures, in the event that compensation is required (subject to meeting the tests under Stages 3 and 4 of the HRA process).</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Biodiversity	<p>Negative effects on undesignated habitats, species, valuable ecological networks and ecosystem functionality.</p>	<p>The mitigation hierarchy comprises 4 tiers and is essential for all development projects aiming for No Net Loss or Net Positive Impact or for adopting a Net Positive Approach It is based on a series of sequential steps that must be taken throughout a project's life cycle in order to limit any negative impacts on biodiversity.</p> <p>It was identified that a default precautionary multiplier of 2 has been proposed by the Applicant to compensate for losses of habitats, and a detailed, quantified list is provided of proposed habitat creation actions. In summary this list prescribes provision of 18ha of species-rich neutral grassland, 40ha of fen, 4ha of swamp/wet grassland, 8.2ha of wetland including wet woodland, 26ha of ponds/lakes, 32.4ha of deciduous woodland, 1ha of traditional orchard, 17.2ha of lowland meadow and 6.0km of ditch. These measures give totals of 146ha of habitat and 6km of linear watercourse.</p> <p>Consideration of the potential requirement for areas greater than those proposed has also been made, to compensate for the possibility of adversely impacting the biodiversity resource of the proposed compensation sites themselves. Parcels of land totalling an area of 217ha have been identified by the Applicant as possible compensation sites. This area would largely accommodate the 146ha requirement above plus 6ha of scrub and up to 70ha of pasture/rough grassland to compensate for the loss of these less important (not of Principal Importance) habitats</p> <p>An additional requirement for 248.8ha of compensatory habitat which is greater (by 63ha) than the Applicant's recommendation of 217ha, was recommended by the AC due to inclusion of surface access impacts and precautionary allowances for potential indirect effects and protected species.</p> <p>The scheme contains a commitment to mitigation for lost habitat as well as improvement of existing habitat for wildlife, creation of new habitat and development of outdoor leisure opportunities around the airport. The proposals include creation of wetlands, flood meadows, woodland, open water and marginal habitats. All of these areas have the potential to attract hazardous birds to the area or to change the behaviour patterns of birds that are already present and thus create an additional birdstrike risk.</p> <p>The need to manage the birdstrike risk is acknowledged. Any mitigation that involves large scale bird dispersal from e.g. a reservoir has the potential to adversely impact on non-hazardous birds of conservation concern that currently use the site.</p> <p>All mitigation and compensation proposals should be reviewed as further details become available at the project level and in the context of biodiversity no net loss/net gain.</p> <p>The NPS includes the following mitigation, along with other information for the applicant and for decision-making :</p> <p>The applicant's proposal should address the mitigation hierarchy (which supports efforts to</p>	<p>A number of mitigation and compensation measures have been put forward by the promoter which reduce the magnitude of biodiversity impacts.</p> <p>However, it may not be possible to fully mitigate nor compensate for some losses. Project level information is required to better understand impacts.</p> <p>A landscape scale strategy will need to be developed during project design to better determine mitigation and compensation requirements and evaluate the residual effects.</p> <p>At the strategic level the residual effect remains significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>conserve and enhance biodiversity), which is set out in the NPPF<sup>149</sup>.</p> <p>Compensation ratios relating to the effects of the preferred scheme should be considered in more detail during the design. The application of 2:1 compensation ratio is considered to represent the minimum requirement. However, there are other mechanisms for establishing compensation ratios exist such as Defra's biodiversity offsetting metric. Equally it is important to note that habitat ratios form only one part of potential compensation which should be considered and the location and quality of any compensation land is of key importance. In this regard habitat creation, where required, should be focused on areas where the most ecological and ecosystems services benefits can be realised.(5.95).The NPS also acknowledges the importance of ancient woodland and veteran trees (5.103) in addition to opportunities for building in beneficial biodiversity as part of good design (5.104).</p>	

<sup>149</sup> Department for Communities and Local Government, 2012. *National Planning Policy Framework*, paragraph 118. [\[online\]](#) Accessed 06/01/2017.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Soil	Loss of soils, including greenfield and agricultural land from land-take.	<p>Mitigation set out in the AoS includes:</p> <p>As a consequence of the site locations of all schemes, a high proportion of the land take required is from agricultural land, and a low proportion is from Previously Developed Land (PDL). The loss of agricultural land would typically be financially compensated for rather than mitigated against, though in some cases land uses may be relocated to alternative sites.</p> <p>Further Agricultural Impact Assessment surveys could be required to determine the value of agricultural land, and to identify Best and Most Versatile agricultural land in accordance with the guidelines and criteria for grading the quality of agricultural land. This could feed into a strategy to provide mitigation or compensation for this loss. However, it is acknowledged that financial compensation will not mitigate the loss of the resource. Use of best practice means that agricultural and greenfield land take for temporary use during construction would be minimised wherever possible. A strategy for further increasing use of PDL as a means of minimising loss of agricultural land could be substantiated at detailed design.</p> <p>The ecosystem services approach can also be used to consider the environment in terms of the benefits it brings to people, including food production.</p> <p>The contamination of soils should be mitigated through the EIA process and managed through the possible implementation of Environmental Management Plans Appendix A-6 provides more information on these management plans.</p> <p>The NPS sets out a number of measures to be taken into account during assessment. This includes taking into account economic and other benefits of Best and Most Versatile agricultural land (5.108), minimising the direct effects of a project on the existing use of the proposed site, or proposed uses near the site by the application of good design principles, including the layout of the project and the protection of soils during construction (5.118).</p>	<p>No mitigation is possible for the permanent loss of soils, including agricultural land.</p> <p>Whilst it would be possible to compensate for the financial loss of agricultural land, this would not address the effects associated with this loss of resource for food and other benefits. The residual effects remain significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Water	Change in status of surface and/or groundwaters through alteration of waterbodies and impacts on water quality/quantity through the discharge of contaminants, such as de-icer and hydrocarbons and changes in water resource use	<p>The mitigation measures proposed by the applicant include:</p> <ul style="list-style-type: none"> <li>→ Runoff would be directed from the petrol interceptor via an online Total Organic Carbon (TOC) quality monitoring to detect the presence of de-icers. Runoff contaminated with de-icers would be diverted to treatment whereas non-contaminated water would be discharged to the normal attenuation storage.</li> <li>→ Groundwater will be appropriately managed during the construction and operation with consideration given to surface water – groundwater interactions.</li> <li>→ Runoff attenuation SuDS and interceptors to provide storage for major spills.</li> <li>→ A Sustainable Drainage Strategy will include dedicated areas for de-icing aircraft and a glycol recovery procedure to reduce the concentration of glycol within surface water runoff and separate storage tanks for ‘clean’ and ‘first flush’ surface water. There is also the possibility of a new Sewage Treatment Works with some of the treated water to be re-used for non-potable purposes within the airport.</li> </ul> <p>The applicant will need to assess the impacts of the scheme design, on and off site mitigation in relation to how it will interlink as a whole and how it links to the wider water environment and water dependent features (including designated sites across the offsite catchment). The Airports NPS includes the following statements:</p> <p>The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. The project should adhere to any National Standards for sustainable urban drainage systems. The risk of impacts on the water environment can be reduced through careful design to adhere to good pollution practice (5.178-5.181).</p> <p>The proposal would also need to have regard to the Thames River Basin Management Plan and the requirements of the WFD and its daughter Directives, including those on priority substances and groundwater. In terms of WFD compliance, the overall aim of development should be to prevent deterioration in status of water bodies to support the achievement of the objectives in the Thames River Basin Management Plan and not to jeopardise the future achievement of good status for any affected water bodies.</p> <p>If the development is considered likely to cause deterioration of water body status or to prevent the achievement of good groundwater status or of good ecological status or potential, compliance with Article 4.7 of the Water Framework Directive must be demonstrated. The Secretary of State will need to consider the interactions of the proposed project with other plans such as water resources management plans. Consideration will also be given to impacts on water quality / resources.</p>	<p>Measures to reduce water consumption can be effective, however given the predicted passenger increase, and until further design and assessment are undertaken, the effects on water resources are significant negative.</p> <p>Design can also minimise effects on watercourse modifications and can include enhancement. However, considering the scale of the effects it is unlikely to fully mitigate or compensate for modifications. Until detailed design is undertaken the assessment remains significant negative.</p> <p>Despite mitigation at the airport, contaminants such as de-icers do reach receiving watercourses at certain times as no water quality treatment solution is 100% effective. Depending on quantity and frequency of such discharges there is a potential for an adverse residual effect on WFD physico-chemical status</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
			<p>despite mitigation commitments. Under such conditions it may be necessary to offset the deterioration in quality with quantitative improvement measures.</p> <p>The impact is currently such that it is likely that the impact will be required to progress through the exemption provisions of Article 4.7 of the WFD .</p>
Water	Change to flood risk and resilience to climate change.	<p>Design to date has taken into account flood risk through design.</p> <p>The scheme will need to be developed during detailed design to ensure that it is safe from flooding and will not increase flood risk elsewhere from all sources. Detailed hydraulic modelling will be required to understand the interaction between surface and groundwater, needed to develop appropriate mitigation.</p> <p>The NPS includes the following statements:</p> <p>Mitigation measures will need to be developed as part of the applicant's development consent application to ensure that it is safe from flooding, and will not increase flood risk elsewhere for the development's lifetime, taking into account climate change.</p> <p>To satisfactorily manage flood risk and the impact of the natural water cycle on people, property and ecosystems, good design and infrastructure may need to be secured using requirements or planning obligations. This may include the use of sustainable drainage systems but could also include vegetation to help to slow runoff, hold back peak flows and make landscapes more able to absorb the impact of severe weather events .</p> <p>Site layout and surface water drainage systems should be able to cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts.</p> <p>The surface water drainage arrangements for any project should be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed</p>	<p>It is acknowledged that flood risk assessment and design can be effective in reducing flood risk.</p> <p>As detailed flood risk assessment and design has not yet been undertaken, the assessment remains significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>project, unless specific off-site arrangements are made and result in the same net effect.</p> <p>The sequential approach should be applied to the layout and design of the project. Vulnerable uses should be located on parts of the site at lower probability and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife habitat and flood storage uses. Opportunities can be taken to lower flood risk by improving flow routes, flood storage capacity and using sustainable drainage systems (5.158-5.165).</p>	

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Air Quality	Reduced air quality and increased emissions with effects on local communities and sites designated for wildlife.	<p>A number of measures have been incorporated into design by the applicant including a CEMP, Construction Logistics Plan, high level of public transport provision, congestion free access, concentrating airside activities as far as possible from receptors, aircraft engine shut-down (no idling), and cleaner aircraft.</p> <p>The Airports NPS states that the promoter should continue to strive to meet its public pledge that aims to have landside airport related traffic no greater than today (5.38) and set out and regularly review plans to meet mode share targets (5.17). The final package of mitigations should be subject to consultation with local communities and relevant stakeholders to ensure the most effective measures are taken forward.</p> <p>Other mitigation measures listed in the NPS could include, but are not limited to:</p> <ul style="list-style-type: none"> <li>→ Landing charges structured to reward airlines for operating cleaner flights (e.g. NOx emissions charging);</li> <li>→ Zero or low-emission hybrid or electric vehicle use (ultra-low emission vehicles), charging and fuel facilities;</li> <li>→ Reduced or single engine taxiing (improved taxiing efficiency);</li> <li>→ Reducing emissions from aircraft at the gate (e.g. installation of fixed electrical ground power and pre conditioned air to aircraft stands to reduce the use of auxiliary power unit);</li> <li>→ Modernised heating supplies in airport buildings;</li> <li>→ Changes to the layout of surface access arrangements;</li> <li>→ Traffic restrictions and / or traffic relocation around sensitive areas;</li> <li>→ An emissions-based access charge; and</li> <li>→ Physical means including barriers to trap or better disperse emissions and speed control on roads.</li> </ul> <p>Mitigation measures at the construction stage should also be provided and draw on best practice from other major construction schemes, including during the procurement of contractors. Specific measures could include but are not limited to:</p> <ul style="list-style-type: none"> <li>→ Development of a construction traffic management plan (which may include the possible use of rail and consolidation sites or waterways);</li> <li>→ The use of low emission construction plant / fleet, fitting of diesel particulate filters and use of cleaner engines;</li> <li>→ The use of freight consolidation sites;</li> </ul>	<p>These mitigation measures are predicted (based on a number of assumptions) to have the potential to reduce concentrations of pollutants.</p> <p>However, the mitigation measures will have greatest effect in the immediate vicinity of the airport whilst the primary air quality impact of the scheme relates to worsened exceedances of the EU Directive limit values in central London. Reduction in compliance risks primarily relies on actions taken by national, London and local government to reduce emissions on the wider road network, including those in the 2017 Plan.</p> <p>As a result of this uncertainty, the residual effect is assessed as significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<ul style="list-style-type: none"> <li>→ Active workforce management / worker transport scheme;</li> <li>→ Construction site connection to grid electricity to avoid use of mobile generation; and</li> <li>→ Selection of construction material to minimise distance of transport (5.39-5.40)</li> </ul>	
Carbon	<p>Carbon emissions from a number of sources:</p> <ul style="list-style-type: none"> <li>→ Increased airport capacity leading to a net change in air travel;</li> <li>→ Airside ground movements and airport operations;</li> <li>→ Changes in non-aviation transport patterns brought about by a schemes surface access strategy; and</li> </ul> <p>Construction of new facilities and surface access infrastructure.</p>	<p>Potential mitigation measures in Appendix A of the AoS include:</p> <ul style="list-style-type: none"> <li>→ Airside Ground Impacts: efficient runway and taxiway design and use, use of fixed electrical ground power and pre-conditioned air, reduced engine use during taxiing.</li> <li>→ Surface Access: Surface Access Strategy to incentivise modal shift towards public transport, improve infrastructure for and incentivise the use of electric and alternatively-fuelled vehicles.</li> <li>→ Energy and Fuel Use: use of energy efficient design and construction techniques, specification of high efficiency plant and equipment, including energy efficient baggage handling systems, including LED lighting, incorporation of low carbon and renewable energy technologies such as combined heat and power, heat pumps, solar PV and biomass boilers where technically feasible, use of biogas and alternative energy sources for ground vehicle fleet, regular monitoring of energy use through metering system.</li> <li>→ Construction: Construction Environmental Management Plan (CEMP).</li> </ul> <p>Mitigation measures at the construction stage should also be provided and draw on best practice from other major construction schemes, including during the procurement of contractors (5.80). Specific measures could include but are not limited to:</p> <ul style="list-style-type: none"> <li>→ Development of a construction traffic management plan (which may include the possible use of rail and consolidation sites);</li> <li>→ Transport of materials to site by alternative modes to road (i.e. by rail or water);</li> <li>→ Increased efficiency in use of construction plant, for example through no-idle policies;</li> <li>→ Use of energy efficient site accommodation;</li> <li>→ Reduction of waste, and the transport of waste, for example through increasing on-site recycling;</li> <li>→ Construction site connection to grid electricity to avoid use of mobile generation;</li> <li>→ Smart energy management practices;</li> <li>→ Select construction material to utilise low carbon options, such as carbon-negative cement; and</li> <li>→ Select construction material to minimise distance of transport.</li> </ul> <p>The applicant is expected to take measures to limit the carbon impact of the project, which may</p>	<p>There is potential to significantly reduce carbon emissions through project design, construction and operation.</p> <p>As these measures have not yet been specified during detailed project design, the assessment remains significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>include, but are not limited to: (5.78):</p> <ul style="list-style-type: none"> <li>→ Zero or low-emission hybrid or electric vehicle use (ultra-low emission vehicles), charging and fuel facilities;</li> <li>→ Reduced or single engine taxiing (improved taxiing efficiency);</li> <li>→ Reducing emissions from aircraft at the gate;</li> <li>→ Reduced emissions from airport buildings (for example lower carbon heating);</li> <li>→ Changes to the layout of surface access arrangements; and</li> </ul> <p>Encouraging increased use of public transport by staff and passengers,</p>	
Resources and Waste	Consumption of natural resources, particularly non-renewable. This is anticipated to be greatest during construction period.	<p>Two main management / mitigation strategies for minimising construction waste arisings were proposed for the LHR-NWR. These strategies included:</p> <ul style="list-style-type: none"> <li>→ development of a Masterplan to take into account potential waste impacts on communities and the natural environment; and</li> <li>→ development of a Site Waste Management Plan (SWMP) which would seek to minimise the volume of waste disposed to landfills, and increase recycling rates of arisings generated during the construction phase.</li> </ul> <p>At the next stage of scheme development, there are a number of mechanisms considered appropriate for minimising impacts associated with resource consumption and waste. All the following measures should be adopted and associated opportunities maximised to ensure the preferred scheme is exemplar:</p> <ul style="list-style-type: none"> <li>→ Adverse effects during construction and operation should be managed by operating in the highest tiers of the waste management hierarchy. This could require the adoption of the principles of resource efficiency, with opportunities maximised by designing for re-use and recovery, resource optimisation, off-site construction, resource efficient procurement, and designing for the future<sup>150</sup> (design); Establishing a Proximity Principle Strategy, to ensure arisings generated are handled, stored and managed as close as possible to the point of origin (design);</li> <li>→ On-site good practice behavioural incentives and training schemes (construction);</li> </ul>	<p>Adoption of measures that align with the highest tiers of the Waste Management (Resource Efficiency) Hierarchy<sup>151</sup> have the potential to significantly reduce the magnitude of the consumption of virgin materials and waste disposed of during construction and operation.</p> <p>However, due to the scale of the infrastructure, measures are unlikely to fully mitigate negative effects. As the positive effects (potential success) of proposed mitigation measures are yet to be</p>

<sup>150</sup> WRAP, 2015. *Designing for Resource Efficiency, The Five Principles*. [online] Accessed 24/12/2015.

<sup>151</sup> Article 4 of the revised EU Waste Framework Directive (Directive 2008/98/EC) sets out the 'waste hierarchy' with five steps for dealing with waste, ranked according to environmental impact.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<ul style="list-style-type: none"> <li>→ (As stated previously) development of a WMP to forecast (design) and verify (construction) arisings. The WMP would include guidance on waste prevention, segregation, storage, handling, transportation, reuse, recycling, treatment and – where necessary – disposal of specific waste streams;</li> <li>→ Preparation of a CL:AIRE Code of Practice Materials Management Plan (MMP) (construction);</li> <li>→ Loss on Ignition testing is used to ensure that all wastes identified as qualifying for the lower rate of landfill tax (inert, £2.65 per tonne) are effectively segregated and diverted from landfill (construction);</li> <li>→ Segregation, bulking and secure storage of construction and excavation arisings to enhance the potential for on- and off-site re-use and recycling; reclamation and processing of demolition materials to encourage on-site re-use (construction);</li> <li>→ Re-use of excavated topsoil and agricultural subsoil as fill, as close to the point of excavation as practicable (construction);</li> <li>→ Re-use of surplus excavated material from other developments in London and South East for fill applications (construction);</li> <li>→ Re-use of construction materials, incorporation of recycled / secondary content in products, and deployment of materials with other sustainability credentials (construction);</li> <li>→ Development and implementation of a Resource (including waste) Management Strategy, including a Passenger Behavioural Change Programme and accompanying waste segregation facilities (operational); and</li> <li>→ Organisational commitments to reduce waste arisings per passenger, endorsed by senior management (operational);</li> <li>→ Specific operational mitigation measures e.g. decreasing newspapers and magazines at gates, collaborations with retail owners to reduce waste at source (operational).</li> </ul> <p>The NPS states that applicant should seek to ensure that all wastes arising from the site are subject to the principles of the waste hierarchy and are dealt with at the highest possible level within the hierarchy.</p> <p>The effects of removing the Lakeside EfW plant upon capacity for treatment of waste will require assessment if not reprovided. (5.135- 5.142).</p>	<p>specified, the residual effect is assessed as significant negative.</p>

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
Historic Environment	Loss and harm to the significance of heritage assets and the wider historic environment including buildings, structures, landscapes, townscapes and archaeological remains and the setting of the assets.	<p>The following mitigation for the LHR-NWR scheme are proposed within the ACs reports<sup>152</sup>:</p> <ul style="list-style-type: none"> <li>→ Scheduled monuments flight sequencing and noise respite measures;</li> <li>→ Listed buildings to be subject to building recording prior to demolition; relocation following recording and some instances of flight sequencing and noise respite measures;</li> <li>→ Non-designated archaeological remains to be subject to a programme of archaeological research investigations, post-excavation analysis and public dissemination.</li> </ul> <p>At EIA level the mitigation proposed should be reviewed and revised following an assessment of the significance of the historic environment including the setting of assets. This will need to be undertaken in accordance with the NPPF so the cultural heritage significance of the assets can be determined prior to a mitigation strategy being applied at project level. This assessment will apply the NPPF heritage values: artistic, architectural, archaeological and historic to each of the designated assets. For non-designated assets including archaeological remains their level of importance will be determined i.e. local, neighbourhood, county regional and national.</p> <p>Following determination of significance a hierarchy of mitigation should be applied:</p> <ul style="list-style-type: none"> <li>→ The first course of mitigation for all statutory designated heritage assets or those non-designated assets of proven similar significance is avoidance.</li> </ul> <p>The next stage is assessment, no detailed mitigation can be proposed until a full investigation of the cultural heritage significance of the assets and the contribution made by their setting has been undertaken. This should be applied using the NPPF heritage values (artistic, architectural, archaeological and historical) along with the appropriate form of fieldwork investigation. Principles that can apply to assessment are set out in Appendix A-11.</p> <p>Should substantial public benefits of the scheme outweigh the harm or loss to the assets then the next course of action would be mitigation through design and/or enhancement. Possibilities for maximising the enhancement of the heritage assets and their settings should be explored. This can include public engagement and interpretation.</p> <p>Should the impacts of the scheme be physical, i.e. the demolition of a building, then following assessment of significance, and assuming that relocation of the building to an appropriate museum is not an option an Historic Building investigation should be undertaken. At this stage the HARR and listed building designation should be updated. Where preservation or</p>	<p>Although mitigation strategies would be developed by applicant at project level, it should be noted that these would not fully mitigate effects, particularly in the event of total destruction and impact on setting.</p> <p>As mitigation strategies have yet to be further developed and given that they would not fully mitigate loss and harm identified, the assessment remains significant negative.</p>

<sup>152</sup> Jacobs, November 2014, 10. *Place: Assessment*, Section 4. [\[online\]](#) Accessed 23/12/2015.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>archaeological remains is not an option then there is a need to assess the archaeological significance in the context of a 'research strategy' to identify appropriate mitigation investigation strategies.</p> <p>→ Where appropriate seek to encourage opportunities to enhance the significance of heritage assets through the design, planning and implementation of a proposal. Individual proposals would need to be covered in the design stage as stated.</p> <p>The NPS notes that where the proposed development will lead to substantial harm to or the total loss of significance of a designated heritage asset, the Secretary of State should refuse consent unless it can be demonstrated that the substantial harm or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm, or alternatively meet a number of conditions. Where the proposed development will lead to less than substantial harm to the significance of a designated heritage asset, this harm should be weighed against the public benefits of the proposal, including securing its optimum viable use (5.203 -5.206).</p> <p>The applicant should look for opportunities for new development within Conservation Areas and WHSs, and within the setting of heritage assets, to enhance and better reveal their significance. Proposals that preserve those elements of the setting that make a positive contribution to or better reveal the significance of the asset should be treated favourably. (5.208).</p> <p>Provisions are also made for recording of heritage assets, adherence to written scheme of investigation and treatment of undiscovered heritage assets (5.209-5.212).</p>	
Landscape	Effects on designated and undesignated landscape/townscape/waterscape (including historic landscape) and character, sensitive views and indirect effects from lighting and loss of tranquillity.	<p>Continued development of landscape mitigation proposed by the applicant to provide multiple environmental objectives, including those relating to biodiversity, noise and the setting of heritage assets, whilst contributing positively to the wider green infrastructure.</p> <p>The promoter for LHR-NWR proposes to minimise impacts on existing landscape character and heritage assets.<sup>153</sup> The proposed mitigation would reduce the effects of the proposals on water, biodiversity, landscape and recreational features and would redevelop part of the Colne Valley Regional Park.</p> <p>Measures would include habitat creation areas, a diversion of the Colne Valley Way and improvements to recreational areas runway.</p> <p>The NPS includes the following:</p>	Measures proposed for LHR-NWR would provide higher quality, more accessible open space than exists at present, which could be of greater benefit in terms of landscape character, recreation and amenity, and will include ecological compensation habitat areas

<sup>153</sup> Runway Innovations Ltd, 2014. *Heathrow Expansion Updated Scheme Design – Executive summary of submission to the Airports Commission* by Runway innovations Ltd and Heathrow Hub Ltd, pp. 14-15. [\[online\]](#) Accessed 24/12/2015.

TOPIC	SUMMARY OF SIGNIFICANT EFFECT	SUMMARY OF MITIGATION	RESIDUAL EFFECT
		<p>Adverse landscape and visual effects may be minimised through appropriate design (including choice of materials), and landscaping schemes. Materials and designs for the airport should be given careful consideration (5.217).</p> <p>Where green infrastructure is affected, the applicant should aim to ensure the functionality and connectivity of the green infrastructure network is maintained and any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space, including appropriate access to National Trails and other public rights of way (5.119).</p> <p>Public rights of way, National Trails and other rights of access to land are important recreational facilities for walkers, cyclists and equestrians. The applicant is expected to take appropriate mitigation measures to address adverse effects on National Trails, other public rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve access. In considering revisions to an existing right of way, consideration needs to be given to the use, character, attractiveness and convenience of the right of way (5.123)</p>	<p>and river flood alleviation mitigation proposals. Impacts on landscape character would be relatively contained, given the limited land take and present levels of low tranquillity. Overall, the impact of the scheme on existing landscape character would be adverse.</p> <p>Mitigation has the potential to reduce potential landscape and visual impacts. However, given the scale of infrastructure proposed and nature of indirect effects such as lighting and noise, residual negative effects are likely.</p> <p>As mitigation strategies have yet to be further developed and given that they would not fully mitigate loss and harm identified, the assessment remains significant negative.</p>

## 7.6 MONITORING

- 7.6.1 As set out in section 3.3.20 above, measures to monitor the predicted significant environmental effects and uncertainties of the implementation of the NPS are proposed in this section. In this AoS, monitoring has been proposed where there are significant residual effects or uncertainties regarding significant effects in order to identify unforeseen adverse effects at an early stage and facilitating appropriate remedial action. The proposed monitoring can consider the baseline and the beneficial, cumulative, secondary and synergistic effects over the policy's lifespan.
- 7.6.2 It is the applicant's responsibility to monitor significant effects. A frequency for monitoring has been proposed but it is acknowledged that this will need to be refined during project design when more information will be available about the characteristics of the impact.

Table 7.4: Monitoring of Significant or Uncertain Effects for LHR-NWR

Topic	Objectives	Summary of Effect	Proposed Monitoring	Responsibility	Proposed Frequency
Community	1. To avoid or minimise negative effects on community viability, including housing, facilities and indirect effects.	Significant Effect - Loss residential properties, community facilities; formal and informal recreation sites. Indirect effects from traffic and air quality and noise.	Independent monitoring of performances against commitments to spend money on community compensation, including property purchase offers and further support. Monitoring of numbers relocated, using new community facilities.	Government and Applicant	Regular intervals during construction and early operation.
Community	2. To avoid or minimise disproportionate impacts on any social group.	Uncertain Effect - Disproportionate effects on vulnerable social groups from direct loss and relocation of housing and community facilities; in addition to indirect effects from noise, air quality, traffic housing demand.	Independent monitoring of performances against commitments to spend money on community compensation, including property purchase offers and further support and management measures. Monitoring of numbers relocated, using new community facilities etc.	Government and Applicant	Regular intervals during construction and early operation.
Quality of Life	3. To maintain and where possible improve the quality of life for local residents and the wider population.	Significant Effect- Effects on quality of life from traffic, air quality, noise, displacement and employment.	No specific monitoring identified for QoL Annex – refer to monitoring for air quality, noise, communities.	N/A	N/A
Economy	4. To maximise economic benefits and to support the competitiveness of the UK economy. 5. To promote employment and economic growth in the local area and surrounding region.	Significant Positive Effect - Significant positive effects are identified for employment and the economy.	→ Creation of new job opportunities → Creation of apprenticeships → Benefits of job opportunities and apprenticeships to local communities.	Applicant	To be confirmed (TBC) - Annually as a minimum.
Noise	6. To minimise and where possible reduce noise impacts on human receptors.	Significant and Uncertain Effect - Noise effects on human receptors from aviation and ground noise.	→ Number of people affected by noise arising from airport expansion. The parameters will need to be defined during DCO process.	Applicant	TBC

Topic	Objectives	Summary of Effect	Proposed Monitoring	Responsibility	Proposed Frequency
Biodiversity	7. To protect and enhance designated sites for nature conservation.	Significant Effect - Potential adverse effects on internationally, nationally and locally designated biodiversity sites	<ul style="list-style-type: none"> <li>→ Condition of European Sites (Natura 2000, Ramsar) identified as potentially affected by NPS development,</li> <li>→ Condition of Scientific Interest (SSSIs) identified as potentially affected by NPS development</li> <li>→ Condition of areas subject to enhancement measures</li> <li>→ Condition of areas created as compensation</li> </ul>	Applicant	TBC through project HRA process. Where appropriate to be integrated into Common Standards Monitoring for designated sites
Biodiversity	8. To conserve and enhance undesignated habitats, species, valuable ecological networks and ecosystem functionality.	Significant Effect - Negative effects on undesignated habitats, species, valuable ecological networks and ecosystem functionality.	<ul style="list-style-type: none"> <li>→ Changes in areas of biodiversity Importance (priority habitats and species by type).</li> <li>→ Maintenance of conservation status for species translocations</li> </ul>	Applicant	TBC but likely to be at intervals to include pre-construction, during construction and post-construction.
Soil	9. To protect sites designated for geodiversity 10. To minimise loss of undeveloped soils and of Best and Most Versatile agricultural land, and protect soil against erosion, contamination and degradation.	Significant Effect - Loss and damage to soils, including greenfield and agricultural land from land-take, physical damage and contamination.	<ul style="list-style-type: none"> <li>→ Loss or damage to greenfield land (ha)</li> <li>→ Loss of Best and Most Versatile Agricultural Land (ha)</li> </ul>	Applicant	TBC but likely to be at intervals to include pre-construction and post-construction.

Topic	Objectives	Summary of Effect	Proposed Monitoring	Responsibility	Proposed Frequency
Water	11. To protect the quality of surface and ground waters, and use water resources sustainably.	Significant Effect - Change in status of surface and/or groundwaters through alteration of waterbodies and impacts on water quality/quantity through the discharge of contaminants, such as de-icer and hydrocarbons and changes in water resource use.	<ul style="list-style-type: none"> <li>→ Water Framework Directive (WFD) status of water bodies</li> <li>→ Compliance with discharge consents and abstraction licences</li> <li>→ Water supply zones: supply/demand balance</li> </ul> (Surface water quality monitoring would be undertaken in key risk construction areas in close proximity to surface watercourses and boreholes will be installed)	Applicant	TBC
Water	12. To minimise flood risk and ensure resilience to climate change.	Uncertain Effect - Change to flood risk and resilience to climate change.	Areas at risk of flooding (fluvial, groundwater, sea level rise)	Applicant	TBC
Air Quality	13. To improve air quality and reduce emissions consistent with EU, national and local standards and requirements.	Significant and/or Uncertain Effect- Reduced air quality and increased emissions with effects on local communities and sites designated for wildlife.	Emissions of air pollutants such as nitrogen oxides (NOx) and particulates  Journeys made to the airport by public transport, cycling or walking.	Applicant	TBC Regular intervals to be determined through Surface Access Strategy.

Topic	Objectives	Summary of Effect	Proposed Monitoring	Responsibility	Proposed Frequency
Carbon	14. To minimise carbon emissions in airport construction and operation.	<p>Significant and/ or Uncertain Effect</p> <p>Carbon emissions from a number of sources:</p> <ul style="list-style-type: none"> <li>→ Increased airport capacity leading to a net change in air travel;</li> <li>→ Airside ground movements and airport operations;</li> <li>→ Changes in non-aviation transport patterns brought about by a schemes surface access strategy; and</li> <li>→ Construction of new facilities and surface access infrastructure.</li> </ul>	<p>Construction emissions through use of a construction carbon footprint monitoring and reporting tool, e.g. BRE SMARTWaste.,</p> <p>Emissions from expansion during operation through use of fuel and energy use monitoring and carbon footprinting techniques to capture emissions from aircraft, airport operations and energy use.</p>	Applicant	<p>Construction – regularly periods (e.g. monthly) throughout construction period.</p> <p>Operation – annually or in relation to Surface Access Strategy.</p>
Resources and Waste	15. To minimise consumption of natural, particularly virgin non-renewable, resources.	<p>Significant Effect - Consumption of natural resources, particularly non-renewable materials, goods and products.</p>	<p>Monitoring during construction and operation of:</p> <ul style="list-style-type: none"> <li>→ Volume (t) of major construction / other materials consumed</li> <li>→ % (by volume / other) of re-used / recycled content</li> <li>→ % (by volume / other) of materials with other sustainability credentials</li> </ul>	<p>Applicant (ultimate responsibility, all phases)</p> <p>Construction contractor (direct, construction only)</p> <p>Supply chain (supporting, all phases)</p>	<p>Construction – monthly throughout construction period, reporting summaries annually</p> <p>Operation – initially quarterly, moving to annually.</p>

Topic	Objectives	Summary of Effect	Proposed Monitoring	Responsibility	Proposed Frequency
Resources and Waste	16. To minimise the generation of waste in accordance with the principals of the resource efficiency hierarchy.	Significant Effect - Disposal of waste to landfill	Monitoring during construction and operation of: → Tonnes of arisings avoided / recovered / re-used / recycled / other diverted from landfill → Total volume (t) of arisings diverted from landfill → £cost savings (e.g. haulage and landfill taxation savings) accrued as a result of landfill diversion	Applicant (ultimate responsibility, all phases) Construction contractor (direct, construction only) Supply chain (supporting, all phases)	Construction – monthly throughout construction period, reporting summaries annually Operation – monthly.
Historic Environment	17. Conserve and where appropriate enhance heritage assets and the wider historic environment including buildings, structures, landscapes, townscapes and archaeological remains.	Significant Effect - Loss and harm to the significance of heritage assets and the wider historic environment including buildings, structures, landscapes, townscapes and archaeological remains and the setting of the assets.	Monitoring the assessment of significance of the heritage assets and their setting. Monitoring the predicted levels of harm to the historic environment. Monitoring of the mitigation strategy during construction for built heritage and below-ground archaeological remains, and during construction and operation for setting.	Applicant	Regular intervals until mitigation strategy fulfilled.
Landscape	18. To promote the protection and improvement of landscapes townscapes, waterscapes and the visual resource, including areas of tranquillity and dark skies.	Significant Effect - Effects on designated landscape/townscape/waterscape (including historic landscape) and character, sensitive views and indirect effects from lighting and loss of tranquillity.	→ Change in the quality of character or status of a designated area. → Changes in settings and views of designated sites. → Monitor / review off site mitigation and enhancement strategy and its implementation	Applicant and relevant statutory bodies where appropriate	TBC but likely to be at intervals to include pre-construction, during construction and post-construction.

# 8

## NEXT STEPS

### 8.1 DEVELOPMENT OF THE AIRPORTS NPS

- 8.1.1 The Government is aiming to provide increased airport capacity for the UK by 2030. The proposed approach to how this will be achieved is set out in the Airports NPS.
- 8.1.2 Before designating the NPS the Secretary of State must first undertake this AoS (in accordance with the Strategic Environmental Assessment Regulations (“SEA Regulations”), which form part of the European Union’s SEA Directive (2001/42/EC)).
- 8.1.3 The public, which includes statutory bodies were consulted on the NPS and AoS for Airports on two separate occasions in February 2017 and October 2017. A number of other documents sit alongside the NPS and AoS and these include a HRA, Equality Assessment and Health Impact Analysis.
- 8.1.4 The Airports NPS has been laid before Parliament for a debate and a vote in the House of Commons. If the NPS is approved, the Secretary of State will then decide whether it should be designated and will make an oral or written statement confirming this decision. If designated, the NPS would provide the primary basis for decision making on development consent applications for a Northwest Runway at Heathrow Airport and would be an important and relevant consideration in respect of applications for new runway capacity and other airport infrastructure in London and the South East of England.
- 8.1.5 The AoS Statement (also known as post-adoption statement) will accompany or follow any designated Airports NPS. This will set out how the environmental considerations and consultation responses have been taken into account when developing the Airports NPS; the reasons for choosing the preferred scheme in light of reasonable alternatives; and how the significant environmental effects of implementing the Airports NPS will be monitored.

### 8.2 WHAT WILL HAPPEN NEXT

- 8.2.1 The Airports NPS identifies a location considered as being able to provide the required increase in UK air capacity. Because expansion of London Heathrow Airport will create additional capacity for at least 10 million passengers per year it meets the criteria for being considered as an NSIP. Before building can begin, a developer will need to obtain a DCO from the Secretary of State. It will be the role of the Planning Inspectorate to examine such an application and to make a recommendation to the Secretary of State on whether the application should be refused or approved. It will be the Secretary of State who makes a final decision.
- 8.2.2 Potentially significant environmental effects will be assessed in an EIA as part of the DCO application and the results of this assessment will be set out in an Environmental Statement. This will form part of any application submitted by the scheme applicant for Development Consent. It will include a detailed assessment of effects that have the potential to be environmentally significant; for instance the effect of noise on local communities, or how the development would affect sites designated for nature conservation, heritage or landscape.
- 8.2.3 The EIA is likely to use much of the information within this AoS to inform the scope of the assessment. However, the EIA will be able to evaluate many of the impacts identified in this AoS in further detail. This process would include further consultation, data collection and baseline surveys. The EIA will be able to draw on more detailed project information to be developed as part of project design, such as surface access proposals and flight paths. Using this information, specific mitigation proposals would be developed. A HRA would also form part of the application.

- 8.2.4 The process for obtaining a DCO has six main stages: pre-application; acceptance; pre-examination; examination; decision; and post decision.

### STAGE 1: PRE-APPLICATION

- 8.2.5 This begins when a developer informs the Planning Inspectorate they intend to submit an application.
- 8.2.6 If designated, the Airports NPS will provide planning guidance for the developer of the scheme. It will establish that the Government considers that there is a need for new airport capacity in the South East of England. There will therefore be no need for the developer to demonstrate or justify the need for additional capacity as part of their application.
- 8.2.7 Before submitting, the developer must consult the public and other stakeholders on their proposals. The length of time taken to prepare and consult on the project will vary depending upon its scale and complexity. Responding to the developer's pre-application consultation is the best time to influence a project, whether you agree with it, disagree with it or believe it could be improved.
- 8.2.8 The developer will also assess the scheme for its environmental impacts at this time, in a process called EIA. The results will be set out in an Environmental Statement, along with how the impacts can be mitigated. This assessment will be informed by the contents of the AoS undertaken whilst the NPS was being developed.

### STAGE 2: ACCEPTANCE

- 8.2.9 It will be up to a developer to submit an application for examination, which will include more detailed plans for the airport expansion.
- 8.2.10 The acceptance stage, which is normally a period of a few weeks, begins when a developer submits a formal application for development consent to the Planning Inspectorate. The Planning Inspectorate, on behalf of the Secretary of State, uses this period to decide whether or not the application meets the standards required to be formally accepted for examination.
- 8.2.11 The Environmental Statement will form part of the submitted application, along with a suite of other information.

### STAGE 3: PRE-EXAMINATION

- 8.2.12 At this stage, the public will be able to register with the Planning Inspectorate and provide a summary of their views of the application in writing. At this stage, everyone who has registered and made a relevant representation will be invited to attend a preliminary meeting chaired by a Planning Inspector.
- 8.2.13 This stage of the process takes approximately three months from the developer's formal notification and publicity of an accepted application.

### STAGE 4: EXAMINATION

- 8.2.14 The Planning Inspectorate then has six months to examine the application. During this stage, people who have registered to have their say are invited to provide more details of their views in writing.
- 8.2.15 The Examination includes hearings where matters which have not been resolved through written representations and which the Inspector(s) wish to examine in more detail are discussed in response to questions put by the Inspector(s) in a non-adversarial setting between the parties.

8.2.16 The Airports NPS forms the basis for the examination by the Planning Inspectorate.

### STAGE 5: DECISION

8.2.17 The Planning Inspectorate makes a recommendation to the Secretary of State within three months of the end of the six month examination period. The Secretary of State then has a further three months to make the decision on whether to grant or refuse Development Consent.

The Secretary of State must decide the application in accordance with the Airports NPS unless he or she is satisfied that to do so would:

- Lead to the UK being in breach of its international obligations;
- Be unlawful;
- Lead to the Secretary of State being in breach of any duty imposed by or under any legislation;
- Result in adverse impacts of the development outweighing its benefits; or
- Be contrary to legislation about how the decisions are to be taken

### STAGE 6: POST DECISION

8.2.18 Once a decision has been issued by the Secretary of State, there is a six week period in which a legal challenge against the decision may be made in the High Court. This process of legal challenge is known as Judicial Review and can only be made on limited grounds.

